THE

VETERINARY JOURNAL

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Editorials.

FOR THE TIME OF TROUBLE.

THE Annual Report of the Proceedings of the National Benevolent and Mutual Defence Association has just been issued, and too much prominence cannot be given to the good work which this Society is doing, and the value of membership. In commenting upon the affairs of the Association the Secretary stated that only 267 veterinary surgeons were subscribers, and as this barely represents 9 per cent. of the profession it makes one ponder as to why the roll call is so small.

It certainly cannot be said that the Association has failed to carry out the duties with which it was originally entrusted, and for which it was formed, for in no case where legitimate help was required has it ever been refused, and, so far as the funds would allow, that help has been liberally and freely given. In that particular the Society has always played its part. The only fault which can be said to lie at its door is the fact that its benefits and other full particulars are not sufficiently often announced in the veterinary press, nor sufficiently brought before the notice of our newly-made (and would-be) graduates. Certainly, at least once a quarter, a simple and plain announcement ought to be put in some prominent position in each veterinary periodical, and in addition to that every College should have a similar announcement upon its notice board; such notices would certainly bring an annual crop of young recruits, men whose subscriptions would extend the sphere of good work which is now being done, and who, in return, would reap the benefit of the moral support which the membership of such an Association always gives. The subscription is such a

small and trivial one that it cannot be for this reason the membership roll is so short, and the benefits to be obtained in the event of arbitrary action on the part of a contentious client are so great that it seems incredible that there should ever be any hesitation. One would think that the very first thing a man would do upon obtaining his diploma would be to join such an Association; the "Defence" portion of it ought to appeal to him even if the "Benevolent" does not. Certainly as soon as he enters practice for himself there can be no excuse. A mistake in diagnosis, a slip in the examination of a horse or dog, may result in a claim for damages which spells ruin to the young beginner, and even to the old-established practitioner it means more than he cares to risk, or indeed, can afford, in addition to the worry and other discomfort.

To the man who has been prudent, and who has joined the Association, the small amount of half-a-guinea a year ensures that if he becomes involved in legal proceedings through some professional business, the Council of the Society will (if only he chooses to ask their advice) aid him in arriving at a satisfactory settlement, and the opposing side will often think twice before bringing the case into court when it is known that it is to contend with a powerful and rich Society, and not merely a struggling individual.

Few of us can afford an expensive law case, and to many it is policy to yield and pay rather than to be involved in heavy costs and interminable worry, but when there is behind us the moral and monetary support of a strong Society it all assumes a different aspect.

The "Benevolent" side, too, must not be overlooked. This Society, together with the Victoria Veterinary Benevolent Society, has done sterling work in relieving the pressing and urgent necessities of veterinary surgeons and their families in time of trouble, and all deserving cases brought before them have had as much help as the funds would possibly permit. Should a member fall on evil times immediate help may be obtained, and should he, on the other hand, be prosperous and doing well, he has the satisfaction of knowing that he is, personally, doing his little bit towards helping one who has not been so fortunate in the toil and stress of a professional career.

The good work done by both these Societies speaks for itself, and we hope that the present year will see at least another hundred fresh subscribers to each—to the Victoria Benevolent Fund for the sake of that good fellowship which one professional man should always be willing to extend to another; and to the National Veterinary Benevolent and Mutual Defence Society on the ground

that, in addition to the aid it extends to the helpless, it also welds us together as a body in time of professional trouble, and helps us out with legal advice and pecuniary aid if occasion requires.

HUMAN AND BOVINE TUBERCULOSIS.

In this issue of the Veterinary Journal we reprint an abstract from the Second Interim Report of the Royal Commission on Human and Animal Tuberculosis, and we strongly recommend a careful perusal of it by all who have not been able to read through the whole of the Report. In our last issue we simply gave the conclusions, and now we give the principal portion of the Report, showing the results of the experiments carried out by the Commission, and the method of reasoning by which those conclusions were arrived at.

Koch's memorable pronouncement in 1901 has been productive of a large amount of good work in the investigation of tuberculosis. He said: "Human tuberculosis differs from bovine, and cannot be transmitted to cattle." On the converse proposition, viz., the susceptibility of man to bovine tuberculosis, he said: "If such a susceptibility really exists, the infection of human beings is but a very rare occurrence, ... and I therefore do not deem it advisable to take any measures against it."

The conclusions of the Commission form a marked contrast to these statements. The results of their experiments caused them to divide the tubercle bacillus obtained from human sources into two classes, viz., Group I. and Group II. The organisms included in Group I. were found to be *absolutely* identical in every respect with the tubercle bacilli obtained from bovine sources. The organisms in Group II. were less virulent than those of Group I., and also differed in some of their cultural properties. But there was no sharp line of demarcation between the cultures, some members of Group I. closely approximating to some of Group II., *i.e.*, the one class appeared to merge into the other. Bovines and rabbits were easily susceptible to organisms of Group I. or of bovine source, but were more or less resistant to the organisms of Group II. On the other hand, guinea-pigs and monkeys were easily susceptible to both groups of human source, and also to the bacilli of bovine source. After discussing the exhaustive examinations of the lesions set up in each case, the Report says: "The tuberculosis set up by the bacillus of human source is, so far as its anatomical

and histological features are concerned, one and the same as the tuberculosis set up by the bacillus of bovine source."

The following statement, however, is the all-important one, and, as we know, it has not been hastily arrived at. "The human body can be infected by bovine tuberculosis. Moreover, the results which we have recorded show that the bovine body can be infected by tuberculosis of human source, in some cases to a complete, in other cases to a limited, extent; bovine animals and man can be reciprocally infected."

We consequently have no hesitation in endorsing the recommendation of the Commission that more stringent measures than those at present enforced should be taken to prevent the sale or consumption of milk from tuberculous cows.

MEAT INSPECTORS AND THEIR QUALIFICATIONS.

THE vital importance of a firm stand as to the pre-eminent right of members of our profession to control, and advise upon, the inspection of meat intended for human consumption is again brought forward in this month's issue of the Journal by an article from the pen of the Veterinary Inspector to the City of Dublin. Naturally, unless our diploma indicates specifically that our graduates have received special training in meat inspection, the members of Corporations and the general public hardly as yet understand that veterinary training includes this qualification. The sooner the Council of the Royal College of Veterinary Surgeons appreciates this the better, as otherwise the Royal Sanitary Institute and the other bodies who grant special certificates in meat inspection will have secured all the best appointments for their own men before we ourselves have awakened.

It is high time this matter was properly attended to, and the words "meat inspection" engraved on the diploma, or a special certificate issued to the effect that the present-day graduate has been through a proper course of lectures and practical demonstrations in this branch. We invite the attention of our readers to this question, and would like to have other views.

Original Articles.

MEAT INSPECTORS AND THEIR QUALIFICATIONS.

BY ANDREW WATSON, M.R.C.V.S, VETERINARY INSPECTOR TO THE BOROUGH OF DUBLIN.

THE Editorial in the March number of the VETERINARY JOURNAL *re* above subject demands the careful consideration of the profession. The number of "plums" for distribution amongst the members of the profession are, in my opinion, few enough, and are certainly not increasing in anything like the same ratio as its members. The Veterinary Officers of Health must be largely increased, as there are so few members of our profession occupying these positions, and such a large number of municipalities which must make these appointments in the near future; unless (and here I apprehend the danger lies) the public health authorities throughout the Kingdom accept as sufficient the certificates of the Royal Sanitary Institute or the Royal Institute of Public Health. This, it may be said, is smoking trouble through a long pipe, but the trend of affairs is in this direction, and let us not be blind to it. We ought to be up and doing, not forgetting that if we want to be sure of peace let us be prepared for war. Can any one say that we are unduly apprehensive in the face of the fact that already some municipal bodies havemade these certificates a *sine quâ non* for candidates seeking their employment? And secondly, have we not the statement facing us that the Local Government Board has given its *imprimatur* to their syllabus and their certificates? In my opinion the Royal College of Veterinary Surgeons should insist on the Local Government Board withholding its sanction to such certificate-granting institutions, when a body is already constituted by Act of Parliament whose graduates are fully competent to deal with all meat and slaughter-houses in their relation to public health. The question that faces us is, "What course should the custodians of our common welfare take to prevent a catastrophe?" We cannot stop these institutions from holding examinations or granting certificates, nor do I think that if we could it would be just or wise to do so, for they supply a great want that could not be supplied solely by the Royal College of Veterinary Surgeons, viz., the ordinary lay inspectors for inspecting the shops of our cities, and the slaughter-houses and their contents. This duty, performed by lay inspectors, is not one that could be performed with dignity by a professional gentleman, and yet it calls for much knowledge of meat and sanitary laws. This knowledge, I can vouch, is tested by the examinations of these institutions. But what is called for is to define the limitations of the certificates. Now, how is this to be best done? Are we to fight these bodies and say, "Thus far shall ye come, and no further," or are we to persuade them into "sweet reasonableness"?

Let us for a moment glance at the list of the Hon. Fellows, Fellows, Members and Associates of the Royal Sanitary Institute: Hon.

Fellows, 40; Fellows, 223; Members, 1,239; Associates, 1,956. These figures are menacing enough, but the social status of a great many of these indicates possibilities of great influence and action. I would also emphasise the fact that they are in friendly association with all the municipal bodies in the Kingdom, and with many other representative bodies, both at home and abroad, as they send delegates to all their yearly deliberations. From this springs a community of interest and fellowship, if from no other cause, why, that of having partaken of the social entertainments which form a very prominent feature in all these gatherings, and the sympathies that spring from these social elements, are often more lasting than those that follow from the common platform of reform and sanitary progress. During a debate in a medical section of the Royal Institute of Public Health last year in Cork, some doctors openly stated that they were aware that veterinary surgeons were attempting to get on top, and from their appearance and attitude I diagnosed that the iron had entered their soul, and that they would contest very bitterly this fight for supremacy. Now, as far as I know, it is not to get on top, but to be left the sole arbitrators in our field, viz., what is diseased and therefore unfit for food, for which we contend. My excuse for bringing in this matter is to show that if this spirit dominates them as a body we have a mighty phalanx to count on amongst the members of the Royal Sanitary Institute, and likewise in the Royal Institute of Public Health. These men, moreover, are spread all over the country, forming, as they do, the Medical Officers of Health for the various Public Health bodies. Their positions give them great scope for moulding the opinions of these public bodies. Is it not reasonable, therefore, to assume that if they are animated by ill feeling towards us, and as they are all (more or less) connected with these institutions, that they will do all they can to forward the candidates holding the certificates of these institutions, and thus efface their rivals? Now, you say this cannot be, for the judges on the bench will insist on expert veterinary opinion. That may be so in some cases, but in a great number they will listen patiently to the men holding these sanitary institute certificates, and feel perfectly safe in giving decisions in accordance with their opinions, and particularly when they know that such bears the approval of the Local Government Board; and thus in a short time they will become a judicial standard. Moreover, the lay meat inspectors very soon begin to arrogate to themselves a knowledge the equal of any veterinary surgeon, and by their glib expressions on organs, glands, tissues and diseases, easily impress the lay man with their erudition on these subjects. Therefore I think, when these facts are calmly considered, viz., the numbers of medical men, not to speak of engineers, embraced in these bodies, and the position they now occupy, and the possibility of hostility to our profession, that fighting them will be fraught with greatest danger. The objective of adopting the course of gentle suasion, therefore, has to be considered.

On looking over the list of members of the Council of the Royal Sanitary Institute, not one member of the veterinary profession is found, although several are to be found amongst its Fellows and Members. Surely no institution which has for its object "to promote the advancement of sanitary science in all or any of its branches, and to diffuse knowledge thereto," can encompass this without the advice

and co-operation of the veterinary profession. Two names amongst its Fellows catch the eye, William Hunting and James King. From my scanty knowledge of the latter, I should say that his knowledge of meat inspection would be indispensable on the council of any such body. In the case of Mr. King, he was apparently only created a Fellow in October, 1905, whilst Mr. Hunting has been in possession of the distinction since February, 1903. Now surely four years, with one's eyes open and a zeal for his mother profession, ought to have prevented the crisis which has now arisen.

If things had not gone so far, and if these institutions had not received the benediction of the Local Government Board, I would agree that the veterinary profession ought not to submit themselves to their examinations for Membership. But then we cannot, I hold, put back the hands of the clock, and now I would postulate that the wisest policy to adopt is one that would allow of directing the policy of these institutions into channels least inimical to the interests of our profession—in other words, by taking the point of least resistance. The course, therefore, that I would suggest is, let us as far as possible obtain a numerical strength amongst their members, and then urge representations on their Council. In this way we will learn their policy, and save the situation, for by personal argument and appeal through our representatives we can point out to those councils where the shoe pinches our profession. Besides, I think that such a course would tend to a true spirit of fraternity and equality between such influential and highly qualified Members of the medical and engineering professions and ourselves. We are, I think, as a profession, too much inclined to be exclusive, too self-conscious of our attainments and progress, and too neglectful of social distinctions. Let us go more amongst the other professions, and let them know what manner of men we are.

Concurrently with this course of action I think the Royal College of Veterinary Surgeons ought to create a degree equivalent to the Diploma of Public Health of the Medical Profession. This, I imagine, would tend to rectify the situation, which holds an undoubted menace to us as matters at present stand. In conclusion, I would impress on the profession the truth, as I understand it, that it would be unwise to assume hostility to the Royal Sanitary Institute or the Royal Institute of Public Health; even if we did succeed in establishing such limitations to our certificated Members as would place our qualifications beyond the region of their encroachment, yet we must not forget that it might establish for many years to come a spirit of resentment and bad feeling that would do us infinite harm in directions that we little dream of. But personally I am of opinion we cannot submerge the Royal Institute of Public Health or the Royal Sanitary Institute, for they count amongst their number men of the highest culture and scientific attainment and of illimitable influence. Besides, their Members are so numerous and their geographical distribution so diverse, as to cause, in the event of revolt, innumerable foci of sympathy on their behalf and to our disparagement.

HIGH PLANTAR NEURECTOMY.

BY J. F. CRAIG, M.A., M.R.C.V.S., PROFESSOR IN THE ROYAL VETERINARY COLLEGE OF IRELAND.

FROM experience in the dissecting room and in the clinique it appears to the writer that unless great care be taken in selecting the site for this operation, some of the nerve supply to the digit below the fetlock will still be retained.

The intention in the operation is to remove the whole of the nerve supply of the limb below the fetlock, and this is effected by cutting through the two plantar nerves. If, however, the operation be performed lower down on either side of the fetlock, a portion of the plantar nerve is not cut, and if the operation be performed well above the fetlock, the fibres contained in the oblique nerve are left untouched.

These considerations have led the writer to publish the following variations in the termination of the plantar nerves and the attachment of the oblique nerve, and to point out what he concludes as being the best site at which the operation can be performed.

Position of the Plantar Nerves.—There are two plantar nerves for each limb, situated in the metacarpal region of the fore limb, in the metatarsal region of the hind limb. These nerves carry the nerve supply of the limb below the fetlock. They are distinguished as internal and external, according to the side to which they belong. The position and relationship of the nerves are, to some extent, different in the fore and hind limb, so that it is convenient to describe the plantar nerves of the fore limb separately from those of the hind limb.

Fore Limb.—The plantar nerves of the fore limb begin above the carpus, and descend behind the latter and through the metacarpus, and terminate near the fetlock. The internal plantar nerve is the continuation of the median, and descends through the carpal sheath in company with the large metacarpal artery to gain the metacarpus. The external plantar nerve is formed by the junction of the ulnar with a branch of the median, and passes downwards to the metacarpus, along the inner side of the pisiform bone, outside the carpal sheath.

In their course these nerves give off small lateral branches to supply the neighbouring tendons and ligaments and the overlying skin, and immediately before their termination send some small filaments to the fetlock. The nerve supply to the limb below the fetlock is carried by the terminal branches of the plantar nerves. In addition to the small lateral branches above mentioned, the internal plantar nerve detaches one exceptionally large branch, the oblique nerve. This nerve is given off a little below the carpus, and passes obliquely downwards and outwards, behind the flexor tendons, to join the external plantar nerve a little above the fetlock.

There are three considerations to be taken into account when selecting a spot for section and excision of part of the plantar nerves: (1) the most superficial point at which the operation can be performed; (2) point of termination of the plantar nerve; (3) attachments of the oblique nerve.

The most Superficial Point of the Plantar Nerve lies in the lower half of the metacarpus. In the upper portion of the latter region it is partly covered by the fibrous membrane which extends downwards from the carpus, and near its origin it is deeply situated in or near the

carpal sheath. It is therefore in the lower portion of the metacarpus that it is most convenient to operate on the plantar nerves, and, as it happens, this position in no way interferes with the other considerations above noted.

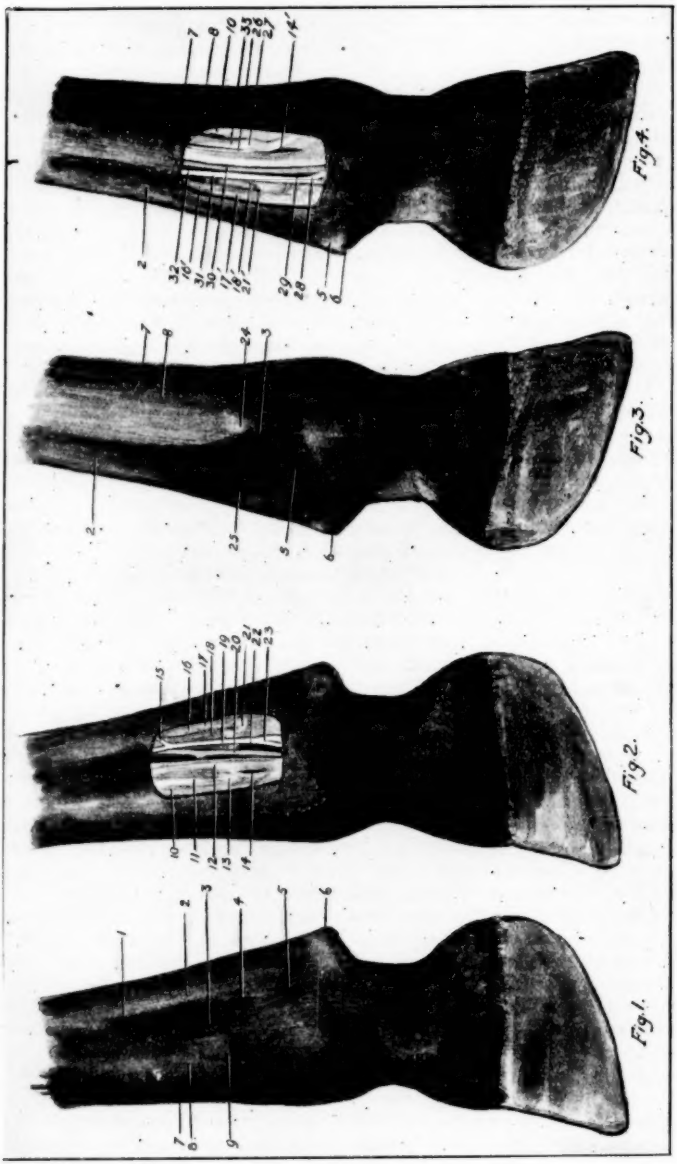
Guide Lines for the Position of the Nerves in the Lower Part of the Metacarpus.—The large metacarpal bone is subcutaneous at the side of the metacarpus, and immediately behind its lateral border lies the small metacarpal or splint bone. This latter bone can easily be distinguished from the large metacarpal bone in the lower third of the metacarpus, because it stands out and ends below in a small nodule, the button, which can be made to spring under pressure of the finger. In clean legs this nodule can easily be made out. In thickened or "gummy" legs it is detected only with difficulty. In the latter case, when the posterior line of subcutaneous bone is examined from above to below, at least a sudden outcut is noticed in the lower third of the metacarpus. That notch marks the lower extremity of the small metacarpal bone, and therefore the position of the button.

This button of the splint bone has been regarded by the writer as being quite constant enough in position to act as a point from which the position of high plantar neurectomy may be noted, and also to measure the points of termination of the plantar nerves and the attachment of the oblique nerve. The only other points which may be taken for the same purposes are the fetlock joint and the sesamoid bones. The plantar nerves have been spoken of as terminating near the most prominent point in the fetlock joint. That, of course, means the point at which the fetlock is broadest when looked at from the front. It is, however, so indefinite in outline that it would appear to be of little value for the purpose for which it is put forward. The same objection applies to the choice of the sesamoid bones as points from which the site of high plantar neurectomy may be ascertained. In the living animals the sesamoid bones cannot be accurately mapped out, and therefore are not of very great service in this direction.

The measurements taken from the bottom of the splint bone were not made directly but from the level of the buttons, and were vertical in position. It is important to note this because the plantar nerves lie some distance behind the small metacarpal bone. Moreover, the measurements were taken when the limb was in a state of extension. This is the position of the limb required during operation, and it must not be overlooked because of the structures in the limb varying in position with the movements performed.

Behind the metacarpal bones the suspensory ligament is placed, and its lateral border stands out from behind the bone under the skin in the lower third of the metacarpus. The flexor tendons lie behind the suspensory ligament and form the cord-like posterior border of the metacarpus.

Relationships of the Plantar Nerve in the Metacarpus.—The plantar nerves descend vertically in the metacarpus, along the antero-lateral aspect of the flexor tendons, and more particularly the flexor perforans tendon. The external plantar nerve is related in front to the external metacarpal vein. The internal plantar nerve is separated on its anterior aspect from the internal metacarpal vein by the large metacarpal artery, as far down as the level of the button of the splint bone. Reaching the latter point the artery sinks more deeply between the



(For explanation of the figures see p. 203.)

References to Illustration.

Fig. 1.—Outer side of metacarpus.

(1) Line indicating suitable position for flexor tenotomy.
(2) Position of flexor perforans and perforatus tendons.
(3) Position of suspensory ligament.
(4) Line indicating position of incision in plantar neurectomy.
(5) Area where the digital vessels and plantar nerve can be rolled under the finger
(6) Ergot.
(7) Position of extensor pedis tendon.
(8) Large metacarpal bone.
(9) Button of external splint bone.

Fig. 2.—Outer side of the metacarpus, dissected.

(2 to 9) as in fig. 1.
(10) Small portion of large metacarpal bone exposed.
(11) External small metacarpal bone.
(12) Border of suspensory ligament.
(13) Button of external small metacarpal (splint) bone exposed.
(14) Area where synovial membrane of the fetlock becomes superficial in front of the suspensory ligament.
(15) Oblique branch joining external plantar nerve.
(16) Lumbricales muscle.
(17) Flexor perforatus.
(18) Flexor perforans.
(19) External plantar nerve.
(20) External metacarpal vein.
(21) Spot where the synovial membrane of the great sesamoidean sheath is very superficial.
(22) Digital artery.
(23) Termination of external plantar nerve.

Fig. 3.—Inner Side of Metacarpus.

(24) Button of internal small metacarpal bone.
(25) Line indicating point of incision for neurectomy of the internal plantar nerve.

Fig. 4.—Inner Side of Metacarpus, dissected.

(26) Interosseous muscle.
(27) Button of internal small metacarpal bone exposed.
(28) Termination of internal plantar nerve.
(29) Internal digital artery.
(30) Internal metacarpal vein.
(31) Internal plantar nerve.
(32) Large metacarpal artery.
(33) Internal small metacarpal bone.
14, 16, 17, 18, 21, as for outer side, fig. 2.

(For explanation of the figures see p. 203.)

flexor tendons and suspensory ligament. Hence, below this point, the internal metacarpal vein and artery are in contact. A little further down the digital artery appears between the vein and nerve. Occasionally this artery places itself at first in front of the vein, before taking up its position between the vein and nerve. At the side of the fetlock the relationships are the same for both sides of the limb. The plantar nerve lies behind, the digital artery in the middle, and the vein in front. Here the artery and nerve, or its posterior digital continuation, can be rolled under the finger, and in some cases by this means the nerve, which is the posterior structure, can be traced as far upwards as the button of the splint bone, but above this point the nerve or artery cannot usually be felt on manipulation. Moreover, the plantar nerve, metacarpal vein and digital artery are subcutaneous in position. The vein and nerve are more superficial than the artery, and are therefore first met with in a dissection or operation. In an operation the two former structures are more easily brought to the surface of the wound. The nerve is distinguished from the vein or artery by appearing longitudinally striated and showing no indication of containing blood. The reaction of the nerve to pinching should not be a means of identification, as the animal ought to be under the influence of a local or general anæsthetic. Although these structures are spoken of as

being subcutaneous, a very slight dissection can expose them only in finely-bred, clean-legged animals after the skin is incised. In the legs of cart horses, and in thickened legs especially, the vessels and nerves are surrounded by an appreciable, sometimes considerable, quantity of connective tissue, which must be removed before these structures can be clearly shown up.

The plantar nerve is occasionally crossed on its outer side, a little below the level of the button of the splint bone, by a small vein which passes near the ergot upwards and forwards to join the metacarpal vein. The great sesamoid sheath extends upwards between the flexor perforatus and perforans tendon, for a distance of about one inch above the level of the lower extremity of the small metacarpal bone. This sheath is unsupported at the side above the fetlock, and bulges outwards in tendinous wind-galls so as to approach the plantar nerve. In tendinous wind-galls, therefore, care must be taken in dissecting out the nerve not to open into the sheath.

Points of Termination of the Plantar Nerves of the Fore Limb in Relation to the Buttons of the Splint Bones.—The plantar nerve of each side breaks up ultimately into three branches called the digital nerves, distinguished as anterior, middle and posterior. Of these, the anterior and posterior are the largest and most important. The middle digital nerve is small and irregular in its origin, sometimes being detached from the anterior, sometimes from the posterior, digital nerves, and at other times formed by the junction of branches from both anterior and posterior digital nerves. At the termination of the plantar nerve there is, therefore, usually only an indication of two branches, the anterior and posterior digital.

The accompanying table is a record of a series of cases examined in the dissecting room. One hundred and fourteen plantar nerves in all were dissected in fore limbs. Of these one half were external plantar, the other half internal plantar nerves. Fifty-six nerves belonged to near fore limbs, fifty-eight to off fore limbs. The subjects used for the purpose were for the most part dissecting room subjects, varied in breed and in height from about 13 to 17·2 hands. A few of the subjects were thoroughbreds.

In all those cases, with two exceptions, the plantar nerves terminated below the level of the button of the splint bones. These exceptions are marked 9 and 24 respectively in the table, and in each of them the external plantar nerve terminated opposite the button of the splint bone. The distance between the level of the button of the bone and the termination of the plantar nerves varied, as can be seen by referring to the table, not only in different animals, but in individuals and even in the same leg. In fifteen limbs only was the distance the same for both the internal and external plantar nerves, and in only two of these instances did the fore limbs belong to the same animal. The average length of the plantar nerve below the level of the button of the splint bone was about 1·3 inches. The extreme length, which occurred only in one instance (13), was $2\frac{3}{4}$ inches, and then in connection with the external plantar nerve. The average length in the case of the internal plantar nerve was over 1·3 inches, and for the external plantar nerve a little over 1·2 inches.

The variations did not appear to depend on the height or breed of the animal. Compare case 11, a 13-hands gelding, with 19, a 17·2-

hands gelding, or case 4, of the American trotter, or 26, the thoroughbred stallion, with any others in the table.

Oblique Branch, (a) *Point of Detachment from the Internal Plantar Nerve.*—This point is so high up in the limb near the carpus that it is never likely to cause any trouble to the surgeon when he is performing high plantar neurectomy on the inner side. The average point at which the oblique nerve was detached from the internal plantar nerve was about 3½ inches above the level of the button of the internal splint bone. The greatest distance from the button was 5 inches, and occurred in case 30, and the shortest 2½ inches, occurring in case 27. Here, again, the distance did not vary directly with the height of the animal.

(b) *Point of Junction of Oblique Branch with External Plantar Nerve.*—This occurs at a much lower level than the point at which the branch is given off from the internal nerve. The direction of the oblique nerve can be readily traced in a well-bred, clean-legged animal, by examining the metacarpus with the hand along the flexor tendons. The oblique branch can then easily be felt under the skin. In only three cases did the oblique branch not join the external plantar nerve above the level of the button of the splint bone. These instances are 22, 26, and 30 in the table, and in each animal only in one limb. In all the other cases the oblique nerve joined the external plantar from ½ inch to 2 inches above the button of the splint bone. In the average case the distance was about 1 inch.

Seat of High Plantar Neurectomy in the Fore Limb.—From what has already been stated, it may be gathered that the greatest care requires to be taken in choosing the site of operation on the external plantar nerve. Here, in the average case, 2½ inches intervened between the junction of the oblique nerve and the termination of the external plantar; the shortest distance was 1 inch in case 24, and the greatest distance was 4 inches in case 14. The incision should be made ¾ inch to 1 inch in length, vertically along the antero-lateral aspect of the flexor tendons, and the upper extremity of the incision should be on a level with the button of the splint bone. The length of the nerve corresponding with the length of the incision should be excised.

On the inner side greater latitude may be taken in selecting the site of operation. The operation may, with advantage, be performed higher up than the button of the splint bone so as more completely to avoid the danger of opening into the great sesamoid sheath. This latitude may be taken because the attachment of the oblique branch from the internal plantar nerve occurred in no case lower down in the metacarpus than 2½ inches above the level of the splint bone. The relationship of the plantar nerves, already noted, will give an idea of the structures to be dealt with at the site of operation just indicated.

Hind Limb—Position of Plantar Nerves.—The plantar nerves of the hind limb begin above the hock as the terminal branches of the posterior tibial nerve, and they extend downwards behind the tarsus, in front of the thick fibrous membrane which forms the posterior boundary of the tarsal sheath, and through the metatarsus, to terminate near the fetlock as in the fore limb. In their position and relationship in the metatarsus the plantar nerves of the hind limb differ from those of the fore limb in the following ways: The large metatarsal artery, corresponding with the large metacarpal artery of the

Table I.

Measurements (in inches) of the Termination of Plantar Nerves, and the Origin and Attachment of the Oblique Nerve in the Fore Limb from the Level of the Button of the Splint Bone.

Subject	Termination of plantar nerves below button splint bone		Attachment of oblique nerves to plantar nerves above button splint bone	
	Internal	External	To internal plantar	To external plantar
1. Gelding, 14 hands.				
Near fore limb	1	1¼	4	1
2. Mare, 15 hands, remount.				
Off fore limb	1½	2	4½	1½
Near fore limb	1	1¾	4	2
3. Gelding, 15·2 hands, remount.				
Off fore limb	1¾	1¼	4	¾
Near fore limb	1½	2	4¼	1
4. American trotting stallion.				
Off fore limb	1½	1½	3½	1
Near fore limb	1	2	3	1
5. Mare, 15·3 hands.				
Off fore limb	2	1	4	¼
6. Mare, 15 hands, half-bred.				
Off fore limb	2	1	4	1
7. Mare, 16 hands.				
Near fore limb	1¾	1	4¼	2
Off fore limb	2½	½	3½	¾
8. Well bred mare, 15·2 hands.				
Near fore limb	¾	1	3	¾
Off fore limb	1	¾	3½	1
9. Mare, 15·3½ hands.				
Near fore limb	1¾	¾	4	1¼
Off fore limb	½	Opposite button	4½	2
10. Mare, 15·2 hands.				
Near fore limb	¾	1	3	¾
Off fore limb	¾	¾	4	1¼
11. Gelding, 13 hands.				
Near fore limb	1¼	¾	3	1¼
Off fore limb	1½	½	3	1½
12. Gelding, 14 hands.				
Near fore limb	1	¾	3¾	1¾
Off fore limb	½	1¾	3½	¾
13. Mare, 14·3 hands.				
Near fore limb	2	2¾	3½	½
Off fore limb	2½	2½	2¾	½
14. Gelding, 14·2 hands.				
Near fore limb	1¾	1	4	1
Off fore limb	1½	2	4	1½
15. Gelding, half-bred, 15 hands.				
Near fore limb	2	1	3¾	1½
Off fore limb	1¼	1	3	1
16. Gelding, 14·3 hands.				
Near fore limb	2	1	3½	½
Off fore limb	2	1½	3	¾
17. Mare, 14½ hands.				
Near fore limb	1	1	3	1
Off fore limb	1	1½	3	½
18. Mare, 14·3 hands.				
Near fore limb	2	2	3½	2
Off fore limb	2	2	3½	1¼
19. Gelding, about 17·2 hands.				
Near fore limb	¾	¼	4	2
Off fore limb	¾	¾	4½	1½

Subject	Termination of plantar nerves below button splint bone		Attachment of oblique nerves to plantar nerves above button splint bone	
	Internal	External	To internal plantar	To external plantar
20. Gelding, about 15 hands.				
Near fore limb	1	1	3½	1¼
Off fore limb	1	1	3½	1
21. Gelding, about 15·3 hands.				
Near fore limb	1¾	1	3½	1½
Off fore limb	1	1	3½	1
22. Mare, about 14·3 hands.				
Near fore limb	1	1½	4½	Opposite button splint bone.
Off fore limb	1	¾	3¾	1
23. Gelding, about 13·3 hands.				
Near fore limb	2	1	3½	1½
Off fore limb	2	1½	3½	1½
24. Mare, about 15.2 hands.				
Near fore limb	½	½	4	2
Off fore limb	¾	Opposite button	3	1
25. Gelding, about 16 hands.				
Near fore limb	1	½	3½	1¾
Off fore limb	¾	½	3½	1½
26. Thoroughbred stallion, about 16 hands.				
Near fore limb	1¾	2	3	Opposite button.
Off fore limb	1¾	1½	4	¾
27. Gelding, about 14·1 hands.				
Near fore limb	1	1¾	3½	½
Off fore limb	1	1	2½	½
28. Gelding, about 15·2 hands.				
Near fore limb	1½	1½	4	1
Off fore limb	1½	1¾	4	½
29. Mare, about 14 hands.				
Near fore limb	1	2½	3	1
Off fore limb	1½	1½	3½	1
30. Mare, about 15 hands.				
Near fore limb	2	1½	5	Opposite button.
Off fore limb	2¼	1	4	½

fore limb, descends in the metatarsus on the outer side, between the large and small metatarsal bones. Each nerve is related in front to a metatarsal vein. A small artery descends from the tarsal arch at the side of the flexor tendons, sometimes in front of, sometimes behind the nerve, as far downwards as the lower third of the metatarsus. Below the button of the splint bone the relationships of the planter nerves are as for the fore limb. The button of the splint bone is not so prominent in the hind limb as in the fore limb.

Point of Termination of the Plantar Nerves of the Hind Limb.—These observations were made, as indicated in the accompanying table, in 110 nerves, half of them being external, half of them internal plantars. The numbers of the subjects in the table correspond with those in the table of plantar nerves of the fore limb.

In all cases the plantar nerves of the hind limb terminated below the level of the button of the splint bone; in the average cases for both plantar 2·1 inches, for the internal plantar nerve nearly 2 inches, and for the external plantar nerve a little over 2 inches. The longest distance of the termination of the plantar nerve below the level of the button was 4½ inches, occurring in only one hind limb (26), the shortest distance, ¼ inch, occurring only in one case, the internal plantar nerve of the near hind limb of the gelding 17·2 hands (19). Again, breed or height appear to have little to do with the variations.

Table II.

Measurement (in inches) of the Termination of the Plantar Nerves, and the Attachments of the Oblique Nerve in the Hind Limb from the Level of the Button of the Splint Bone.

Subject	Termination of plantar nerves below button of splint bone		Attachment of oblique nerve	
	Internal	External	To internal plantar above button	To external plantar below button
1. Gelding, 14 hands.				
Near hind limb	2	2	3	¾
Off hind limb	1½	2	2½	½
2. Mare, 15 hands, remount.				
Near hind limb	2	3	2¼	¾
Off hind limb	1½	1½	2	1
3. Gelding, 15·2 hands, remount.				
Near hind limb	2	1½	3	¼
Off hind limb	2	1½	2½	¾
4. American trotting stallion.				
Near hind limb	2¾	3	2¼	¼
Off hind limb	2	2	2¼	½
5. Mare, 15·3 hands.				
Near hind limb	2½	2½	2	1
Off hind limb	1¾	2	3	½
6. Mare, 15 hands, half bred.				
Near hind limb	3¼	3½	2½	¼
Off hind limb	2	2	2½	¼
7. Well bred mare, 15·2 hands.				
Near hind limb	1½	2	2	¼
Off hind limb	3	2¼	2¼	¾
9. Mare, 15·3½ hands.				
Near hind limb	1¼	¾	2	¼
Off hind limb	1¾	2	2½	¾
10. Mare, 15 hands.				
Near hind limb	1½	2½	2¼	¼
Off hind limb	1¾	1	2	¾
11. Gelding, 13 hands.				
Near hind limb	2	2	None found.	None found.
Off hind limb	1	1¾	None found.	None found.
13. Mare, 14·3 hands.				
Near hind limb	2½	2	2	¼
Off hind limb	2	1½	1¾	¾
14. Gelding, 14·2 hands.				
Near hind limb	2¾	3	3	1½
Off hind limb	2½	3	2½	Opposite button splint bone.
15. Half-bred gelding, 15 hands.				
Near hind limb	2½	2½	2¼	½
Off hind limb	2¾	2½	1¾	¼
16. Gelding, 14·3 hands.				
Near hind limb	2¼	2	3	½
Off hind limb	2	2	2½	1
17. Mare, 14½ hands.				
Near hind limb	1¾	2¼	None found.	None found.
Off hind limb	1½	2¼	None found.	None found.
18. Mare, 14·3 hands.				
Near hind limb	2	2	None found.	None found.
Off hind limb	2	3¼	None found.	None found.
19. Gelding, about 17·2 hands.				
Near hind limb	¼	1	3½	½
Off hind limb	1½	1	None found.	None found.
20. Gelding, about 15 hands.				
Near hind limb	3	2	2	Opposite button splint bone.
Off hind limb	2½	4	None found.	None found.

Subject	Termination of plantar nerves below button of splint bone		Attachment of oblique nerve	
	Internal	External	To internal plantar above button	To external plantar below button.
21. Gelding, about 15·3 hands.				
Near hind limb	1	1¼	3	¾
Off hind limb	½	1	None found.	None found.
22. Mare, about 14·3 hands.				
Near hind limb	2	1½	3½	½
Off hind limb	1½	1½	4	½ above.
23. Gelding, about 13·3 hands.				
Near hind limb	2	3	None found.	None found.
Off hind limb	2	3½	None found.	None found.
24. Mare, about 15·2 hands.				
Near hind limb	1½	1½	2	Opposite button splint bone.
Off hind limb	2	2½	1½	1
25. Gelding, about 16 hands.				
Near hind limb	2	1½	2½	¾
Off hind limb	1½	3½	2½	¼
26. Thoroughbred stallion, about 16 hands.				
Near hind limb	2	3	None found.	None found.
Off hind limb	2½	4½	None found.	None found.
27. Gelding, about 14·2 hands.				
Near hind limb	2½	3½	2½	¾
Off hind limb	3½	3½	2½	¼
28. Gelding, about 15·2 hands.				
Off hind limb	1½	2	3	½
29. Mare, about 14 hands.				
Near hind limb	1¾	3	2	½
Off hind limb	2½	3	1½	½
30. Mare, about 15 hands.				
Near hind limb	2	2	1	¾
Off hind limb	3½	3	2	½

Oblique Nerve.—Just as in the fore limb, the plantar nerves of the hind limb communicate by means of an oblique branch similarly disposed. This nerve is, however, not constant, and when present much smaller in the hind limb. In thirteen of the hind limbs examined no trace of an oblique branch could be found (11, 17, 18, 23 and 26 [both hind], and in 19, 20 and 21 [off hind only]).

(a) *Point of Detachment of the Oblique Branch from the Internal Plantar Nerve.*—In extreme cases the highest point was 4 inches above the button splint bone (22), and the lowest point was 1 inch (30). The average point of detachment occurred about 2½ inches above the button of the splint bone.

(b) *Point of Junction of Oblique Branch with the External Plantar Nerve.*—In only one instance in the hind limb (off hind of 22) did the fusion occur above the level of the button of the splint bone, and in that case ½ inch above it. The junction of this nerve with the internal plantar was the highest yet noted. In three cases (14 [off hind], 24 [near hind], 20 [near hind]) the oblique branch joined the nerve opposite the button of the splint bone, and in other cases the point of junction varied from ¼ inch to 1½ inches below the button. The average distance below the latter level was about ½ inch.

Seat of Operation in the Hind Limb.—In the hind limb, as in the fore limb, the greatest care in the selection of the site of high plantar neurectomy requires to be taken for the external plantar nerve. The

length of the external plantar nerve, between its termination and the junction of the oblique branch, varied from ½ inch, as in gelding 17·2 hands (19, near hind limb), to 3½ inches, as in near hind limb of subject 27.

To ensure the whole of the fibres in the external plantar nerve being cut through, the upper extremity of the incision should be made about ¼ inch below the level of the button of the splint bone at the antero-lateral aspect of the flexor tendons. Thence the incision should be carried vertically downwards for a distance of about 1¼ inches. The plantar nerve, corresponding to this area, should be completely excised. By this means the extreme cases are taken into account, where the external plantar nerve ends ¼ inch below the button of the splint bone (19), or the oblique branch joins the external plantar 1½ inches below the same level (14).

For the internal plantar nerve, the operation may be performed higher up with advantage so as to avoid the great sesamoid sheath. This is permitted as in the fore limb because of the high position of the detachment of the oblique branch. The operation should here be performed opposite to or little above the level of the button of the splint bone, and the length of the incision should be from ¾ inch to 1 inch. The precautions to be taken are those which have been indicated when noting the relationships of the nerve.

Clinical Articles.

CHRONIC METRITIS IN THE MARE.

BY W. L. WILLIAMS, PROFESSOR OF SURGERY IN THE NEW YORK STATE VETERINARY COLLEGE.

CHRONIC metritis in the mare has not received that attention from writers upon Veterinary Obstetrics or Gynæcology which its importance deserves. The affection is not at all rare in the mare, and offers rather serious obstacles to the veterinarian in its handling by the methods which have been in vogue. In the Journal for January, p. 30, Professor F. Hobday, F.R.C.V.S., contributes an interesting article, entitled "Pus in the Uterus; Ovaro-hysterectomy and recovery." Speaking of the disease in the bitch and the cat, he makes the interesting observation that "It is usually met with in bitches or cats which have had one or more litters and not been allowed to be bred from again, although this rule is by no means constant, and one may meet with it in the maiden bitch." This observation of Professor Hobday's is applicable also to chronic metritis in the mare, in which the disease is most frequently seen in animals which have at some previous time been bred from and have then been allowed to go without further attempts at breeding. It is consequently more common in our observation in localities where few horses are raised, rather than in breeding districts where nearly every mare is used for breeding purposes.

The symptoms of chronic metritis in the mare consist usually of a general appearance of indifferent or poor health, with some emaciation and want of power of endurance. Accompanying these systemic dis-

turbances there usually appears from time to time a discharge of pus from the vulva. This discharge is sometimes constant and dribbles away, especially when the mare is moved rapidly upon the road or when she is lying down. If it is at all constant the tail and thighs will generally be found soiled. In many cases the discharge of pus is only at very wide intervals of time, and apparently proceeds from the over-distention of the uterus, which causes sufficient pressure finally to force the cervix uteri and bring about the escape of a large portion of the contents. In these cases it behaves usually somewhat as an abscess, which, becoming filled with pus, evacuates, the cervical canal again closes and the abscess cavity again becomes distended. Sometimes the evacuation of pus is preceded by symptoms of colic and expulsive efforts.

The amount of pus which may be discharged at a given time varies between a few pints and four or five gallons. The character of the pus is variable, it usually presents the ordinary appearances of pus from an abscess, with the admixture of more or less mucus. In many cases it is comparatively free from odour, while in others it is quite fœtid. The colour is usually yellowish or bluish-white, or may be of a dirty, greyish colour, and in one case the pus was black, somewhat flocculent, and presented the appearance to the naked eye of a disintegrated melanotic tumour.

Upon vaginal exploration the vagina is usually normal, or possibly the mucosa is somewhat irritated because of the presence of the pus from the uterus. When the *os uteri* is reached it is found to be closed as a rule, and it may prove exceedingly difficult to insert one finger. If the cervical canal can be passed, the uterine cavity is found filled with pus and the uterine walls paretic and denuded of their epithelial covering. Exploring *per rectum* the uterus is found to be greatly distended, lying inert, and containing from one to several gallons of liquid, which fluctuates upon palpation.

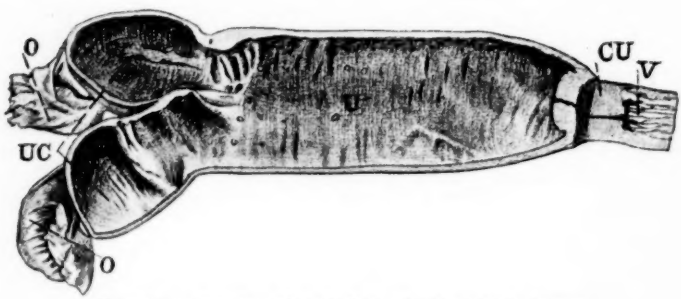
There are few affections which may be confounded with chronic metritis in reference to diagnosis. Occasionally we meet with a similar discharge from the vulva in case of a very large calculus in the bladder, which causes a purulent cystitis. Other forms of purulent cystitis may cause like symptoms, as might also a malignant tumour of the bladder when breaking down. Chronic vaginitis might also be mistaken for this affection, except for the manual exploration. In Case 3 we record an instance of teratologic development of the uterus, which induced symptoms of chronic metritis.

The basic cause of chronic metritis is not well understood, although it seems generally to bear some relation to breeding, as it is rarely seen in others than those which have been bred. We have no definite knowledge of the character of the bacterial invasion, though, judging from the physical appearances of the pus and other conditions, the variation must be great, and usually it is probably a mixed infection.

The changes induced in the uterus consist chiefly of a thickened and sclerotic condition of the *cervix uteri*, with extreme narrowing of the *os*, causing a great accumulation of pus in the uterine cavity. The mucous membrane completely loses its ordinary character, ulcerating patches appear, and as shown in the accompanying figure the *cornua* become displaced from their normal position at right angles to the uterine body, and push forward somewhat in the direction occupied by

the *cornua* in the uterus of the cow. The normal longitudinal folds in the mucous membrane are entirely obliterated, and in their place there appear numerous transverse ridges in the muscular walls.

The handling of chronic metritis in the mare must be based upon the problem of local disinfection, the principal obstacles to which are, the sclerotic condition of the *cervix uteri* and the paretic state of the uterine walls. The fundamental duty of the practitioner is to bring about a thorough dilation of the *os* to such a degree as to permit the insertion of the operator's hand into the suppurating cavity. This requires much patience and hard work in many cases, but is of such great importance that it should be persevered with until fully accomplished. In some cases it requires patient endeavour, extending over several hours, to dilate the *os* sufficiently to insert a finger. When this has been attained the uterus can be flushed out somewhat ineffectively by passing a tube through the *os* and through it injecting a large volume of antiseptic fluid, and then siphoning it out by means of the tube through which it entered. But the further dilation of the os must be persevered in before recovery can be assured. This may be accomplished with the fingers and hand of the operator by repeated efforts upon succeeding days.



Uterus from a dissection subject, illustrating chronic metritis in the mare.

V, Vagina; CU, cervix uteri; U, uterus; UC, uterine cornua; O, ovary.

The partially dilated *os* may also be tamponed with antiseptic gauze or other material, which, remaining in place for twenty-four hours, tends to cause a dilation or softening of the parts.

The large and powerful uterine dilator may be of great service in forcibly dilating the *os*, rendering it very much easier for the operator.

We have not resorted to dilation of the *os* by means of incisions, but this would seem to be perfectly practicable and safe after viewing the conditions as seen in the accompanying figure. The dilation by incision could be best made with a straight, probe-pointed bistoury or with the urethrotome. Such incisions would doubtless lighten the work of dilation, and would seem to us to be accompanied by very little danger; but it should be cautiously done, and preferably several shallow incisions made in different directions rather than a single one of greater extent, which might lead to a perforation. In our experience we have

not found the incisions necessary, though admittedly we have done an enormous amount of work in order to accomplish our ends.

Once the *os uteri* is sufficiently dilated to admit freely the operator's hand we are in a position to proceed with other final problems of disinfection. With good drainage the question of a choice of disinfection is not supremely important. Any reliable disinfectant will accomplish the end, but it needs be intelligently applied, almost always by the veterinarian himself. It is needless to say that the disinfecting solution should be sufficiently voluminous to fill the uterus two or three times successively, so as to insure the thorough cleansing of the cavity at each operation. The flushing of the uterus should occur regularly as often as once a day, and should be persevered with until success is obtained.

Among the disinfectants, permanganate of potash in weak solution is highly efficient. In our experience we seem to have the best results with a solution consisting of carbolic acid, tannin, glycerin and water. We have varied the strength of this solution according to circumstances, as related in the cases given below. It is important to make the solution as strong as will be borne without irritating the organ. It is well to remember that most disinfectants are quickly absorbed and their action ceases. In this respect iodoform offers special advantages. After cleansing the suppurating cavity thoroughly with one of the foregoing disinfectants, a veterinary gelatine capsule containing 5 or 10 grammes or more of powdered iodoform may be taken, and, carrying it with the hand into the cavity, open the capsule and scatter the powder over the uterine floor. The specific gravity of the iodoform causes it to drop into the folds and irregularities of the *mucosa* and prevents its being thrown out, while its feeble solubility causes a continued action for a day or more. At the same time it acts somewhat as a local anæsthetic and tends to prevent straining.

When the disinfectant becomes effective it is indicated by a decreased discharge of pus, the disappearance of any odour which may have been present, the discharge becomes more and more mixed with mucus, the *mucosa* of the uterus gives to the hand the normal touch, the uterine walls become active and approach each other so that they lie in contact.

When local treatment has been begun there is usually an increased systemic disturbance due apparently to an accelerated absorption of septic material. In order to counteract this it is well to administer tonics and antiseptics, such as nux vomica and iron, and potassium iodide, hydrastis Canadensis, or other agents. The mare should be kept directly under the supervision of the veterinarian from the beginning of the treatment to its successful termination, and should on no account be entrusted to an ordinary layman. The treatment should not be stopped or relaxed until the recovery is complete. By following these lines of handling we have not met with an unsuccessful case, while we do not recall an instance where it has proven successful when the application of the remedies has been entrusted to a layman.

Upon the question of breeding again we have no definite data, but our impression is that the oviducts become occluded during the course of the disease, and that as a general rule the animal would be permanently sterile.

I append a record of cases of this disease which have been entered in the clinic of the New York State Veterinary College.

CASE 1.—A mare, aged 15, was entered on March 11, 1899, because of a vaginal discharge. An examination revealed a copious discharge of dirty, whitish pus from the uterus. The *os uteri* was constricted. The uterine cavity was first injected with warm water and later with 1-5000 corrosive sublimate solution. On March 12, a horse catheter was introduced through the constricted *os* and 1 gallon of pus siphoned out, after which the cavity was injected with 1-5000 corrosive sublimate solution.

This line of treatment was continued until the 16th, when the *os* and uterine cavity were tightly packed with gauze saturated in creolin solution. On March 23 the *os* had become so dilated and the uterus had regained its power so that the pack of gauze was expelled. There was no longer an appreciable amount of pus in the uterus. On March 25 the packing of the uterus was discontinued and creolin solution was substituted for the corrosive sublimate in irrigating. The suppuration had ceased and the mare was discharged. The treatment had occupied a period of two weeks.

CASE 2.—The patient was a mare aged 9, weighing about 1,100 lbs. She was entered on January 9, 1900, with the history of a vaginal discharge since June, 1899, or a period of seven months. She had been served in June, 1899, without result. Exploration *per rectum* revealed the uterus greatly distended with fluid. A rubber hose was passed into the uterus and 5 gallons of pus were siphoned out. A weak solution of creolin was then injected into the uterus by gravity and allowed to escape. The uterine cavity was then packed with three yards of cheese-cloth saturated with 2 per cent. creolin solution.

On January 10 the same treatment was applied and 5 yards of cheese-cloth was used in packing. The same course was pursued on January 11. On January 12 the uterus was washed with creolin solution and packed with gauze saturated with carbolic acid solution, which was left in place until January 14, when it was re-dressed. On January 15 the patient seemed worse. In order to bring about a more complete dilation of the constricted *os* a new plan of packing was adopted. A bag was made of sufficiently strong cloth, with a diameter of about 4 or 5 inches and a length of 3 feet. It was saturated with creolin solution, sprinkled with iodoform and then oiled, and the closed end passed into the uterus. Through the open end there was then passed 3 yards of cheese cloth, partly into the uterus but largely in the canal of the *cervix*.

There was given internally for the five following days 1 drachm of powdered nux vomica and one half dram sulphate of copper twice daily. A manual examination of the uterine cavity showed that the *cornua*, in their paretic state, tended to become reflexed upon themselves in a way to prevent good drainage. This difficulty slowly disappeared as the case progressed. On January 17 the creolin injection was displaced by 1-2500 corrosive sublimate solution, and, in addition, iodoform powder was introduced into the uterus on January 20, 22 and 23. She now improved very rapidly. The internal treatment was continued. The mare was discharged on the 23rd convalescent, after fourteen days of treatment.

CASE 3.—A mare, aged 4, weighing about 1,050 lbs., was entered

on January 7, 1901, with the history that she had suffered from a vaginal discharge since one year old. The discharge was of a light colour and was dropping away continuously, keeping the tail and thighs badly soiled. She had not been bred from and had never shown signs of œstrum. Upon making a manual exploration it was found that the *os uteri* was open and the hand could be passed through it readily. The right *cornu* appeared normal, while the uterine body with the left *cornu* formed a remarkable, large, elongated cavity. The uterus and *cornu* had a peculiar property of ballooning under the movement of the hand, like the vagina.

The case is inserted here because of its unique character. It offers the general external appearance of chronic metritis, except that the discharge was mucoid in character rather than purulent. It was apparently a case of teratology by which the uterus had developed like the vagina and should physiologically have been considered a part of that organ. The owner was requested to return the animal for further study, but failed to do so. No treatment was prescribed.

Case 4.—An imported French draught mare, aged 23, and weighing about 1,350 lbs., was entered in the clinic on February 13, 1902, for chronic metritis. She had a copious discharge from the vulva of a thick, fœtid pus. The tail had a number of small melanotic tumours. The uterus was washed with a weak solution of carbolic acid. On February 14 the discharge seemed somewhat decreased and potassium permanganate solution was used as a wash, and the same was repeated on the 15th. On the 17th the uterus was packed with cheese-cloth saturated with iodoform and vaseline. On the 18th the pack was omitted and the uterus was washed with a solution of carbolic acid and bi-carbonate of soda, which was continued on the 19th and 20th. On the latter date there was but a small amount of discharge.

On the 21st the discharge seemed worse. The uterus was washed as before. Following the washing a suppository of iodoform, tannin, vaseline and beef tallow was introduced into the uterus. On the 22nd the uterus was washed with carbolic solution, and after it had been expelled there was inserted into the uterine cavity, and allowed to remain, a solution consisting of tannin 1 oz., carbolic acid 1 drachm, glycerine 4 ozs., tepid water 1 pint. Under this treatment the discharge rapidly abated. This treatment was continued daily until March 3, when the patient was discharged practically convalescent, with directions for the owner to continue the disinfection of the uterus for seven or eight days.

Case 5.—A farm mare, aged 11, was entered in the clinic on April 25, 1904. She had been in the hands of the present owner for three years. Eleven months prior to entrance she was taken to a stallion for breeding, and upon examination by the stallion groom it was found that the *os uteri* was much constricted. After using considerable force he succeeded in passing one finger through the *os*. Immediately afterwards she was served but did not conceive. Since that time she has regularly showed signs of œstrum. Six months prior to entrance in our clinic the owner observed intermittent discharges from the vulva, of thick, white, muco-purulent character. Upon occasion, while at work, she would discharge a large amount of pus, and then for several days it would virtually cease. Examination revealed the *os uteri* rigidly contracted. After repeated and laborious attempts we succeeded

in passing two fingers into the uterus. We introduced a piece of rubber hose into the uterus and withdrew seven quarts of a thick, grayish-white viscid pus. We then washed the cavity of the uterus repeatedly with 1-1000 corrosive sublimate solution, after which we introduced some two quarts of the solution into the cavity and allowed it to remain. We then packed the *os uteri* firmly with gauze.

Internally we prescribed copper sulphate 1 and 1½ ozs., nux vomica 3 ozs., potassium iodide 5 ozs., mixed and divided into twenty-four powders, of which two were directed to be given daily in the food.

During the forcible dilation of the *os* the mare strained violently and offered considerable resistance. On April 26 the mare was straining a great deal though not very violently. After removing the pack it was found that the *os* had dilated but little. The rubber hose was again introduced into the uterus and the cavity thoroughly washed out with a solution of lysol. After repeated injection until the siphoned fluid came away clear, we introduced into the uterus a solution consisting of tannin 1 oz., carbolic acid 1 drachm, glycerin 4 ozs., water 1 pint. We then packed the *os* as tightly as possible, after which she strained very violently. She was given one ounce each of chloral and powdered ginger, which gave her relief.

On April 27 there seemed to have been little progress made in dilating the *os* by means of the pack. After thorough disinfection of the parts the *os* was forcibly dilated with the hand until it could be passed into the uterus. The uterus and horns were found greatly dilated, with thickened, paralysed walls. After thoroughly irrigating the cavity with lysol solution, about 1 drachm of powdered iodoform was deposited in each *cornu* and then we injected, and allowed to remain in the uterus, the prescription used upon the preceding day. We then inserted a gauze bag into the *os*, which had been smeared with iodoform and lard, and followed this by packing the bag as full as possible of surgeons' cotton, saturated with corrosive sublimate solution.

On the 28th we removed the pack and found no accumulation of pus. The cavity was washed with lysol, after which the solution of carbolic acid, tannin and glycerin of the preceding days was repeated. On April 29 examination showed that the uterine walls were resuming their normal condition and contractile power. The treatment of the previous day was repeated. The same treatment was applied on the 30th and the case was left without interruption on May 1. Examination on May 2 showed a small amount of mucus in the uterus. The treatment of the previous days was repeated. Recovery was now rapid and she was discharged fully convalescent on May 7, or thirteen days after the beginning of the treatment.

Case 6.—A mare, aged 14 weighing about 1,050 lbs., was entered in the clinic on October 6, 1904, for poll-evil. During the operation for poll-evil under chloroform, there was a constant discharge of a very fœtid, dark brown or black pus from the vulva. A rubber hose was inserted into the uterus and 4 gallons of pus siphoned away. Upon the following day one and a half gallons of pus were removed, and the uterus was washed with a solution of potassium permanganate 1-500, Three of these injections were employed following one another, each consisting of 2½ gallons of the fluid. On the third day the amount of pus collected in the uterus had decreased to one quart. The treatment of the previous days was repeated.

The accumulation of pus in the uterus gradually decreased from day to day under the treatment and became lighter in colour. On October 12 the pus had assumed the ordinary muco-purulent character in colour and consistence and was free from odour.

On the first day there appeared to be some blood clots in the discharge and the highly fœtid pus had the appearance of broken-down melanotic tumours. Microscopical examination of the pus revealed streptococci and a peculiar fungus which was apparently responsible for the colour.

From the beginning of our treatment the mare had received daily in her feed ½ oz. of iodide of potash and ¼ oz. powdered nux vomica. On October 18 the administration of potassium iodide and nux vomica were decreased one half, the discharge was constantly growing lighter in colour, and the pus was being replaced by mucus.

During the entire course of treatment the *os* had been very much constricted, and each day forcible dilation was attempted, but it was not until the 20th that it was practicable to insert the entire hand into the uterus. On the 22nd the potassium permanganate injection was replaced by the carbolic acid, tannin and glycerine solution described in the previous cases. On October 24 the same treatment was repeated, with the addition of one ounce of powdered iodoform deposited in the uterus before the injection of the disinfecting solution. On October 26 the *os* was well dilated, there was a small amount of mucus present, the uterine walls were contracting, and the patient was virtually convalescent. She was discharged on October 27, after twenty-one days' treatment.

Case 7.—A mare, aged 7, weighing about 1,000 lbs. was entered in the clinic on October 13, 1904, for chronic metritis. The owner related that she had had a very pendulous abdomen for some time and had shown an intermittent vaginal discharge. She had expelled a considerable quantity on the day of entrance. A rubber tube was inserted into the uterus and 5 gallons of thick, whitish pus withdrawn. The *cervix uteri* was hard and unyielding and the *os* much constricted. The *mucosa* of the uterus felt much thickened. Only two fingers could be passed through the *os* into the uterus. The uterus was washed daily up to October 20 with a solution of permanganate of potash. On October 20 the permanganate of potash was discontinued and in its stead we injected into the cavity a solution consisting of tannin one ounce, carbolic acid two ounces, glycerin three ounces, and water one gallon, and this line of treatment was continued until October 25.

Throughout the course of treatment attempts had been made to dilate the uterus, but had not succeeded, and consequently on October 25 we inserted a uterine dilator into the *os* and forcibly dilated it until the hand could almost be passed into it. The *os* was packed with gauze saturated with 2 per cent. lysol. On the following day there was a considerable accumulation of fœtid pus and the *os uteri* was much swollen. The uterus was washed with 5 per cent. potassium permanganate and the *os* was packed with gauze saturated with lysol solution. On October 27 we succeeded in inserting the hand into the uterus and repeated the treatment of the previous day. This treatment was continued until November 3, when the cavity was injected with corrosive sublimate solution, after which we deposited in the uterus

half an ounce of iodoform and two ounces of olive oil. This line of treatment was now continued and the case improved rapidly until November 16, when the patient was discharged convalescent.

Case 8.—A farm mare, aged 21; was entered in the clinic on May 3, 1905, for chronic metritis. The owner related that a whitish vaginal discharge had to some extent been present for three years. She had given birth to a foal in the spring of 1904, since which time the discharge had been much increased. The *os uteri* was dilated so that the hand was readily passed into the cavity. The uterine walls were flaccid and thickened. The uterus contained a collection of fœtid pus. The uterus was washed with 1-2,000 corrosive sublimate solution.

Owing to the paretic condition of the uterine walls there was difficulty in expelling the fluid. She was given internally nux vomica and sulphate of copper. The case was discharged on the day of entrance and the owner was directed to wash the uterus daily with 1-2,000 corrosive sublimate solution. It was later reported that in the hands of the owner the treatment proved unsatisfactory and the animal was destroyed.

MOUTH TUMOUR IN A DOG.

BY R. LEWIS GREEN, M.R.C.V.S., DUDLEY.

Subject.—A fox terrier dog, aged 4.

History.—This animal was sent in to our infirmary on December 12 last with a tumour about the size of a sloe, involving the two central incisors on the lower jaw. He was placed under chloroform, the tumour removed, the bone curetted, and the surrounding tissue dressed with strong caustics. On the following day he was sent home with general instructions as to the cleanliness to be observed, a mouth-wash being given to the owner.

On January 22 I received a telephone message saying "the tumour had grown again to almost its original size." Arrangements were made for the dog to be readmitted.

On examination I found what the owner said was quite correct, and came to the conclusion it was useless to follow previous procedure, so decided to remove the portion of the jaw from which the tumour originated, taking care to get well to the right and left of it, in order to avoid a recurrence.

The animal was prepared, and on the following day chloroformed with a Hobday apparatus: when well under the anæsthetic the muzzle was removed. The two lower "canines" were the outside limits of the operation site, and all intervening incisor teeth were extracted, the tissues from mucous membrane to bone being cut through and stripped off in a triangular direction, taking the "canine teeth" as the base. A section of bone was then excised with bone forceps, care being taken not to reach the posterior margin of the body, thus obviating separation of the rami. The operation wound was well washed with a warm solution of chinosol and plugged with boric acid. After repeating this procedure for three consecutive days, the animal was sent home with a plentiful supply of 2 per cent.

lysol solution, instructions being given to cleanse the wound thoroughly three or four times daily. I saw the dog ten days later, when he was going on well, and has since made a complete recovery. Up to the present time there has been no relapse or return of the growth.

AN INTERESTING CANINE CASE.

BY G. S. THOMAS, M.R.C.V.S., CHICHESTER.

THE subject was a three-year-old Labrador retriever dog, which was suffering from loss of appetite, and when first seen was breathing heavily. On examination of his chest, I found that he was suffering from an attack of endocarditis, and there was a distinct whistle at the valves, which convinced me that vegetations has formed there.

Treatment consisted of hot flannel packs, with brandy and strychnine every four hours. Feeding with milk and rabbit jelly.

The dog's condition remained the same for about a week, but when examining him one morning I noticed the whistling sound had disappeared, and the animal appeared much better, and fed well (still soft, easily digested food).

After two or three days he was gently exercised for about five minutes twice a day. At the end of four or five days, on coming out one morning, I noticed he rolled a little on the hind legs. This increased, and in two days he was quite paralysed. I gave him a good dose of castor oil, which operated well. When he commenced to improve so much the brandy and strychnine had been discontinued. I now resumed the strychnine, which seemed to have no power to combat the paralysis, so I felt perfectly convinced that the vegetations, having become detached from the valves and entered the blood stream, were the direct cause of the trouble, so I thought I would see what time would do. At this time an eruption arose all over the dog's back, a kind of pustular eczema. When this dried the whole of the hair came away with the scab. This condition may or may not have had anything to do with the detached vegetations, but I think myself that some of the capillaries had been blocked by the pieces, and that this obstruction starved the skin and caused the trouble. The dog soon afterwards began to get better, and eventually made a good recovery, and has never ailed since.

DROPPED ELBOW.

BY J. MCKENNY, M.R.C.V.S., DUBLIN.

CONSIDERING the following case of much interest, I herewith submit the particulars for the consideration of the profession.

The subject of the case was a bay gelding purchased by a client of mine on December 13, 1906. On the same date I examined it and passed it sound with the exception of its being a grunter. From that date until I again saw it on December 22 it was hunted four times. On the first two occasions it went well and came home sound, but on the third occasion it came home slightly lame on the off fore leg.

Next morning it was almost sound again and was sent to exercise. Three days afterwards it was again hunted and went well and met with no known accident, came home sound and ate up its food. Next morning it was very lame on the off fore-leg, in fact it would not put any weight on the foot. The point of the shoulder and inside the forearm were much swollen.

I was sent for and saw it that evening. The entire shoulder and inside and outside of the forearm were then much swollen, the foot was slightly in advance of the near one, but the knee and fetlock remained in their natural position, and the foot was flat on the ground. However, on causing the animal to move forward it raised the foot from the ground, and I could not make it walk on it. Moving the leg backwards and forwards caused much pain, yet it could be freely moved in that manner. However, on bringing it outwards from the body I discovered a dull crepitus accompanied with great pain, in fact, the animal reared up and became so violent that the groom could not hold the leg. It immediately began to sweat and breathe heavily, and at once the position of the leg was greatly changed, viz., the elbow dropped, the knee advanced, fetlock knuckled, toe on ground and the heel raised off the ground. Although these symptoms are very characteristic of radial paralysis due to fracture of the first rib, however, on account of the swelling and great pain evinced on pressing the inside of the off forearm, I was not satisfied that it was a case of fracture of the first rib, and therefore more carefully examined the painful spot, suspecting that a thorn or some foreign body had entered, but I did not discover a scar, puncture, oozing, or anything that would lead me to conjecture that such was the case.

Under the foregoing circumstances I did not give a definite diagnosis. I ordered some fever draughts to be administered and the leg to be frequently fomented with warm water containing a disinfectant (Jeyes' fluid, as it was at hand), and wrote to the owner (a military gentleman) as follows:

> "Dear Sir,—Late on Saturday evening I attended at ——— to see your dark bay gelding *re* its lameness. On my arrival I found the horse standing on three legs, the off shoulder and forearm much swollen, and on manipulating the parts a slight crepitus, but I could not detect a fracture. I instructed your groom as to treatment and again saw the horse to-day. The swelling on shoulder had greatly diminished, but that on forearm had increased. The muscles of the parts are seriously involved. I will see the horse again on Wednesday and will further report to you.
>
> "December 24, 1906."

For three days the horse ate a little bran mash mixed with boiled linseed, on the fourth day it refused to eat and the symptoms became aggravated. For the following five days it refused to eat anything, and liquid food was given as drenches. During this period the patient suffered great pain, frequently throwing itself down in a most reckless fashion, dashing itself about almost as if it intended to kill itself, which it was with difficulty prevented from doing. A large quantity of straw was kept in the box and the walls were padded, but notwithstanding all the precautions taken to prevent the animal from being injured, the prominent parts of the head and body became covered with bedsores.

On the eighth day from the time I was called in it was evident to me that a deep-seated abscess was forming on the inside of the forearm at the point I first discovered the greatest amount of pain. The fomentations were continued, especially at this point, and next morning the enlargement burst in three places, one orifice anteriorly, another posteriorly on about the same level, and one in the middle lower down. The horse then ate well, was comparatively free from pain, and stood perfectly straight on the leg and could walk tolerably well on it. Of course the lengthened excruciating agony the animal had suffered, and five days without eating, had reduced it to a mere skeleton.

On examining the orifices already mentioned I could pass my finger around each of the muscles, the connective tissue was completely absent, in its place there was abundant quantity of so-called laudable pus, and a large pouch containing matter extending about six inches down the leg. This pouch I split open so as to make a dependent orifice and leave free access to the affected surfaces for cleansing and disinfecting same. I ordered the horse to be brought at once in a float to my infirmary so that I could have it constantly under my care. On its arrival at my hospital I had it placed in a loose-box with its head tied up so that it could not lie down, as I considered the exertion of the affected parts in lying down and getting up would cause much irritation and squeeze the pus into parts that were not already affected by it, and thereby the healing process would be retarded. I did not put the horse in slings as it was very thin and there were bedsores on parts that would have come into contact with the slings. The wounds were frequently syringed with a weak warm solution of lysol, and dusted with thioform. The straw was removed from the stable, as the horse apparently was tempted by it to lie down, and in doing so broke his head-collar; also for sanitary purposes it was advisable, as the floor of the stable could not otherwise be so efficiently kept dry. The horse was fed on bran mashes mixed with boiled turnips, a few sliced carrots, oatmeal porridge, and a little linseed meal. Under this treatment for five days the horse progressed favourably, but on the morning of the sixth day it was very dull (stupid), eyelids drooping, coat staring, refused all food, blowing, legs swollen, and parts of the body bedewed with clammy cold sweat, feverish pulse, and temperature 105·2° F. The quantity of pus was considerably diminished and of a thinner consistency than it had been on the previous day (acrid), and the muscles of the off shoulder were constantly twitching. Evidently "blood poisoning" had set in.

I gave four times a day ½ oz. doses of salicylate of soda mixed with a febrifuge draught, stopped the fomentation, but continued dusting the affected parts with thioform. In thirty-six hours the symptoms were diminished and the animal partook of a little mash composed of boiled turnips, carrots and bran, and in a few days the pyæmic symptoms had completely disappeared and the pus regained its so-called laudable appearance.

At the end of twenty-two days from the time the horse entered my hospital the wounds had so healed as only to show a skin abrasion. The animal was then allowed to lie down and was given three times a day a little exercise. It walked sound, but jogged slightly stiff. In a few days this passed away and the horse trotted sound, and was sent home. He eventually made an excellent recovery.

The point of interest which I specially wish to draw attention to is the similarity of the symptoms in this case and that of fractured first rib. However, the continuous great pain and excruciating agony evinced on pressure on the inside of the forearm, and the fact that the animal was constantly lying down and getting up without any apparent difficulty, indicate that it was not a fractured rib causing paralysis of the muscles supplied by an injured nerve (radial) due to such a fracture, therefore I considered it was an injury to the inside of the leg in the vicinity of the elbow-joint, and the result proved the accuracy of my diagnosis.

The sequel to the foregoing is also of much interest, as the following extracts from the correspondence will show :—

My client wrote : " You took away the big horse from ——— in a float at your own wish, and I naturally expected to find the horse in a comfortable stable, but I found it in an appallingly emaciated condition, and apparently from his appearance half starved, with no straw in the stable. The horse was ungroomed, as his coat testified to. My annoyance at the time was such that I dare not comment on the horse's state for fear of exceeding the limit in expressing that annoyance in words. Perhaps you can offer some explanation as to allowing a horse to get into such a condition."

To this I replied : " I feel much obliged for your very candid comments contained in the letter relating to certain facts which, apparently to me, you do not understand. Your evident unreserved remarks give me an opportunity of explaining to you the facts referred to. I hope to elucidate them so that they will not be obscure or misleading to any ordinary unprofessional gentleman.

" It is a fact that when you came here to see your bay gelding he was chained up in a loose-box without any straw or food in it ; the near hind shoe was off, and the feet were allowed to grow large ; the horse was very thin, on the head and parts of the body were spots denuded of hair, and some healing sores were on the hip on prominent places, and the horse's coat indicated he had not been well groomed. From the foregoing facts you formed the opinion that the horse had been grossly neglected, and under ordinary circumstances I would arrive at the same conclusion, but quite the reverse is the fact, as I will explain. The horse was under treatment, suffering from a very serious deep-seated injury involving important structures, which required that the horse be kept as quiet as possible. A large quantity of liquid had to be frequently applied to the wound previous to its being dressed, therefore for sanitary purposes and to keep the horse from trying to lie down it was necessary to remove the straw.

" The above explains why the horse was chained up in a box without straw. With regard to the feet being allowed to grow long, and one shoe, the near hind, being off, the horse had been too seriously ill to disturb him by shoeing, and the shoe that was off became loose and twisted, therefore was removed two days before you saw the horse, and it was not necessary to put on the shoe as the foot was big and strong. As to the miserable condition, the horse for eleven days previous to coming here was suffering excruciating agony and for some days ate nothing.

Your groom deserves much credit for the manner in which he kept the stable padded with straw to keep the horse from more seriously injuring itself than it has done; but when the animal arrived here the abrasions which you noticed were on it, but it naturally, from the foregoing reasons, was very thin. After it arrived here it suffered from blood poisoning, and it was with great difficulty and much care that its life was saved. The removing its rugs to groom it under such circumstances would probably prove most injurious or fatal.

"I ask you to reflect a moment and compare your horse's condition to that of a human being under similar circumstances, the one in my infirmary and the other in a hospital cared for by the most skilled doctors, and attended to by the most kindly nurses; my stable to a hospital bedroom; the straw to a carpet which often is judiciously removed; horse's head chained up, man's leg placed in a fixed position, horse's undergroomed coat to a man's unshaven face; long hoofs to unkept nails; in both much loss of condition. Now, if a friend of yours met with an accident and you asked to see him, and found him very thin, hollowed cheeks, glaring eyes, uncut hair and unshaven face, would you at once say, 'My poor fellow, you have been grossly neglected'? or would you say, 'You have been very ill, but thank God the skill of the doctors and the care of the nurses have pulled you through'?

"I must say I am much disappointed that you did not at once give me an opportunity of explaining. I did not expect that any one outside the profession could appreciate the correct diagnosis and successful treatment of the case, but I did not anticipate such a rebuff as you have given me. I found it necessary to order your horse to be brought here in a float, as it would be most cruel to attempt to bring the animal here in the state it was in, in fact, the effect would be most injurious, so much so as to render a cure impossible, and yet in your letter you allude to it as a mere whim of mine.

"I may mention the case was intensely interesting to me, as for many years I have made a special study of injuries to these parts; and as to my knowledge there has yet not been published a similar case to the one in question, I intend to record it, and if you will permit me I will relate your dissatisfaction, as it shows that skill, careful and successful treatment are not always appreciated. I sincerely hope that the foregoing explanation of the facts will remove from your mind the very serious misconception of them which you had formed, and I will feel much obliged by your letting me know that such is the case; that is, if I have made the facts clear to you, if I have not I will feel obliged by your letting me have a further communication from you on the subject.

"Yours faithfully.

"James M'Kenny, M.R.C.V.S."

My client replied: "Many thanks for your most lucid explanation, and as to recording the case in scientific journals by all, means do so, but kindly note that I made no comment adversely as to the result of the operation, which was so successful, but to the condition of the horse, and which apparently I was entirely wrong about; so that to record my dissatisfaction of the result of

the operation would hardly be truthful. I did appreciate the result attained, though I own, as I said before, that the horse's condition somewhat surprised me, as it did a few others, but your explanation has of course altered all that."

And I replied as follows: "I thank you very much for your letter of the 11th inst., in which you so frankly acknowledge that you were mistaken as to the various matters relative to your horse under my treatment which you complained of in your previous letter. I consider that in so doing you have acted the part of a brave man and a thorough gentleman. I hope you will excuse me for saying so, but in these times there are too many who, instead of acting as you have done, would have harboured a deadly hatred against me because I explained to them that they were wrong and I was right."

INFECTIVE SARCOMA OF THE VAGINA AND RENAL CALCULI IN A BITCH.

BY G. H. WOOLDRIDGE, F.R.C.V.S., PROFESSOR IN THE ROYAL VETERINARY COLLEGE OF IRELAND, DUBLIN.

Subject.—A valuable aged bull-bitch, the property of Mr. K.

History.—The bitch had been delivered of three litters of puppies while in the possession of Mr. K. The first litter was by Mr. M.'s dog; nine puppies being born on August 8, 1905, all of which lived beyond weaning time. Nothing was noticed wrong with the mother on this occasion, either at the time of service or during pregnancy or parturition. Her next litter of puppies was born on March 25, 1906, to Mr. W.'s dog, eight puppies being delivered, of which only four survived. She was next lined by Mr. M.'s dog again in September, 1906, and from the date of this service she began to show symptoms of vaginal trouble, namely, frequent trickle of blood from the vagina, and frequent micturition, as though there was irritation of the urinary tract. The bitch, however, became pregnant and whelped in due course on November 25. There were seven puppies in this litter, but six of them were either stillborn or died shortly after birth, only one being sufficiently strong to survive to the present date, and to all appearances he is still perfectly healthy. At that parturition there was considerable hæmorrhage, and there was a more or less constant dribbling of blood afterwards. During this period, too, it was found impossible to keep her bedding dry, although fresh straw was given her twice a day. She was brought to the College for treatment on January 20.

Symptoms.—On examining the bitch I found her to be in poor condition and to have anæmic mucous membranes. She appeared to be fairly bright and her appetite was good. There was a blood-stained discharge from the vulva, and on vaginal exploration a tumour mass could be easily felt, with a rough, apparently granulating, surface. It was about two and a half to three inches from the vulval orifice and extended right round the vaginal wall, with the exception of about half an inch on the middle line at the floor, and with only a very small hole

leading through the centre. I consequently imagined (wrongly as I afterwards discovered) that the growth was round the vaginal aspect of the os uteri. The actual seat of the tumour was the vaginal wall on the level of the urethral orifice. There was constantly a slight dribble of urine, so that a wet patch was invariably seen wherever the patient sat, and the lips of the vulva were excoriated. The presence of the tumour appeared to me to be quite sufficient to account for the incontinence of urine.

Treatment and Later History.—After irrigating the vagina thoroughly with chinosol sol. gr. j, to ʒj., the tumour mass was drawn into view at the vulva. The base of the tumour was injected with cocaine grs. ii., hemisine (B.W.& Co. "tabloid") gr. $\frac{1}{25}$, aqua mm. xl., which produced practically complete local anæsthesia and hæmostasis. The growth was then dissected out and the vaginal mucous membrane sutured. I cut and stained sections of the tumour, which showed the usual characteristics of large round-celled sarcoma. It was on further examination of this tumour that Prof. Mettam discovered the presence of spirochætes. After-treatment consisted of daily irrigations with chinosol lotion and the internal administration twice daily of tinct. nucis vom. mm. vii., and spts. Ammon. Arom. ʒ ss. The patient, however, continued to lose condition, and as she was thought to be "fretting" she was taken home about a fortnight later. The vaginal wounds were now quite healed. There was no improvement while at home, so a week later she returned to the College with the information that the dribbling of urine was worse and that she was now off her feed. Then I suspected cystitis and accordingly obtained and examined some of her urine. It was extremely rich in albumen, and microscopically showed numerous pus and epithelial cells, and was literally teeming with various cocci and bacilli. Change of treatment, however, proved of no avail, and she succumbed on February 21, just a month after operation.

Post-mortem examination revealed a small tumour, of similar nature to that removed, just inside the roof of the vulva and about the size of a pea. No other tumours could be discovered in any other part of the body. The bladder was inflamed and showed small blood extravasations into the mucous membrane, but the cystitis was not so intense as I had expected. The uterus showed very clearly the zonary placenta, much more obviously villous than one would have expected in a bitch three months after parturition, but it was otherwise normal. On removing the kidneys, both appeared dull and pale on the outside; on cutting into them the capsule was easily stripped off and they both showed a similar condition of pyelo-nephritis. In each renal pelvis was a considerable number of calculi, for the most part very small, but a larger one in each, very irregular in outline, and greatest length about half an inch and greatest breadth about a quarter of an inch.

This condition of the kidneys had never been suspected during life, the vaginal tumours having appeared to us as being quite sufficient to cause the symptoms until the last week of life.

On looking back again over the case I am of opinion that the bitch became infected with the tumour by the second service, that is, by Mr. W.'s dog. I have been unable to ascertain if anything definite was ever noticed wrong with him, and he is now dead. There is a marked difference in the health of the fœtuses of the various litters, all nine of

the first litter surviving, half of the second litter and only one of the last litter. I have been able to examine carefully Mr. M.'s dog, who lined her the first and third times, and he is perfectly healthy. It was after his later service that the bitch bled so much, and I am of opinion that she was already infected and that the service injured the tumour. It is somewhat remarkable that he escaped infection from the bitch.

One curious feature of my experience with these tumours is that I have never seen them (vaginal sarcomata) in any other species than bull-dogs.

SECOND INTERIM REPORT OF THE ROYAL COMMISSION ON HUMAN AND ANIMAL TUBERCULOSIS.

THE questions before the Royal Commission are:—

(1) Whether the disease in animals and man is one and the same?

(2) Whether animals and man can be reciprocally infected with it?

(3) Under what conditions, if at all, the transmission of the disease from animals to man takes place, and what are the circumstances favourable or unfavourable to such transmission?

ABSTRACT.

The term "tuberculosis" means the changes taking place in the animal body when it is invaded by the organism called the "tubercle bacillus." Hence the problem placed before us by the first term of our reference, namely, "whether the disease in animals and man is one and the same?" may be stated in the following form.

The tubercle bacillus is an organism capable of living, not only within, but also outside the animal body; it may be cultivated on various artificial media. Like other organisms, it exhibits certain morphological characters which may be observed by means of the microscope; it grows and multiplies in certain ways, and it possesses certain physiological properties, through which it acts upon, and is acted upon by, its environment, whether that environment be a living animal body or a lifeless artificial medium.

To determine, therefore, whether tuberculosis in man is one and the same as tuberculosis in animals other than man, we have to enquire not only whether the changes wrought in the human body by the tubercle bacillus are one and the same as those wrought in the bodies of animals other than man, but also whether in all respects, in its microscopical, cultural and other physiological characters, the tubercle bacillus which causes tuberculosis in man is one and the same as the tubercle bacillus which causes tuberculosis in animals other than man. For it is known, on the one hand, that pathological changes apparently one and the same may be brought about by different micro-organisms, and on the other hand, that micro-organisms behaving apparently in one and the same way outside a living body may, when introduced into a living body, bring about changes which are not one and the same. We have accordingly to study and compare the pathological changes character-

istic of tuberculosis in man and of tuberculosis in animals other than man, and to study and compare the morphological, cultural and other features of the tubercle bacillus which bring about these changes in one and the others.

Tuberculosis occurs in many if not all of our domesticated mammals, in the ox, pig, horse, sheep, cat, dog and others. It has also been observed in many wild mammals, the monkey for instance, when kept in captivity. A disease called avian tuberculosis is known to occur in certain birds, and reptiles have been described as suffering from tuberculosis. Hence the phrase tuberculosis in "animals other than man" opens up a very wide field of enquiry. We have, however, in the first instance, thought it desirable to study the subject in its relation to tuberculosis occurring in bovine animals, since this part of the whole problem is of the more pressing practical importance. We shall consider tuberculosis in other animals afterwards.

In attempting to decide whether tuberculosis in the bovine animal is "one and the same" as tuberculosis in man, we have, in accordance with what was said above, to enquire whether the bacillus of bovine tuberculosis is identical in its microscopical, cultural, and other characters with the bacillus of human tuberculosis, and whether the pathological changes brought about in a living body by the one are identical with those brought about by the other. The latter enquiry has led us to introduce the bacillus of human tuberculosis into the bovine body, and to compare the changes set up by that introduction with the changes set up in the bovine body by the bacillus of bovine tuberculosis. In making this comparison, we have found it necessary not to trust merely to such cases of bovine tuberculosis arising naturally as might come within our knowledge, but to introduce artificially the bacillus of bovine tuberculosis into healthy bovine animals. Indeed, in this way only could we make exact comparisons between the two cases.

We have therefore been led to carry on two parallel investigations—an investigation into the effects produced in the bovine body by the introduction of the bacillus of human tuberculosis, and an investigation into the effects produced in the bovine body by the introduction under similar conditions of the bacillus of bovine tuberculosis.

These two parallel investigations have been carried on at two separate establishments, Walpole Farm and Blythwood Farm, placed at our disposal by the generosity of Sir James Blyth. The two farms are more than a mile apart, and every care has been taken to keep the work carried on at the one farm so distinct from that carried on at the other as to preclude all possibility of the one being infected from the other. A detailed description of the two establishments and a general account of the procedure which we have adopted in our enquiries will be found in the introduction.

We have had constantly in mind, and have done our best to avoid, errors which might be introduced, on the one hand, by the occurrence of spontaneous tuberculosis in the animals used for experiments, and, on the other hand, by contamination taking place in the course of an experiment; and we have rigidly excluded all experiments in which any suspicion arose of the one or of the other. By making use chiefly of Jersey cattle, which are remarkably free from tuber-

culosis, we have been able to reduce to a minimum errors arising from spontaneous tuberculosis in bovines; and, in addition, each animal was tested with tuberculin before being used. In the case of monkeys the risk of error from spontaneous tuberculosis was much greater, and we have had to exclude several experiments in which there was reason to suppose that the tuberculosis found was not artificially produced.

Bovine Tuberculosis.

We have made use, up to the present time, of tuberculous lesions from thirty cases of tuberculosis occurring naturally in the ox; to these we refer individually by number, calling them BI. to XXX.

The tubercle bacillus was introduced into the animal used for experiment in the form either of an *emulsion of tuberculous lesions, or of a culture grown on an artificial medium and suspended in innocuous fluid.* In five of the viruses we have made use both of emulsion and of culture from the same lesions, and have been able to compare the results of the two.

Summary of the Effects of the Bacillus of Bovine Tuberculosis.—The bacillus of bovine tuberculosis introduced subcutaneously into the body of a bovine animal as an "emulsion" or as a "culture" may produce (1) a fatal generalised progressive tuberculosis; or (2) a limited retrogressive tuberculosis; or (3) effects intermediate between the above two.

One factor determining the amount of disease produced is the dose, that is to say, the number of bacilli injected, the larger number producing the greatest effect. But in some instances the same quantity of the same emulsion or culture, presumably containing about the same number of bacilli, injected in the same way into two animals of about the same size and age, produced in one animal a much greater effect than in the other. This we attribute to the former animal being more "susceptible" to the bacillus, the tissues having less power of "resistance" than in the latter animal. Hence it is not the absolute dose, the absolute number of bacilli, which supplies a determining factor, but the dose in relation to the susceptibility of the animal.

Again, the effects of emulsions are consistently greater than are those of cultures estimated to contain the same number of bacilli. Certain conditions obtain either in the bacilli themselves or in the medium in the midst of which the bacilli are living, whether in a culture or in an emulsion; and these bring it about that the same number of bacilli are more effective in the one case than in the other.

It will be understood, therefore, that we are not in a position to state absolutely what is the minimum dose which will produce a rapidly fatal generalised progressive tuberculosis in the bovine animal when injected subcutaneously. We have no means of quantitatively appreciating the other determining factors. Our results show that with each of the strains examined, 50 mgrs. of culture, roughly calculated to contain between 200,000 and 250,000 million bacilli, always produce the above fatal results. Such a dose overrides everything. A dose of 10 mgrs. culture, *i.e.*, 40,000 to 50,000 million bacilli, is often fatal but not always, this dose seems to leave room for the play of individual susceptibility. And the smallest dose of culture, 5 mgrs., which led to fatal progressive tuberculosis was calculated to contain 20,000 to 25,000

million bacilli, while the smallest determined effective dose of emulsion contained only 5,500 bacilli.

In striking contrast to the ease with which—an adequate dose being used—a rapidly fatal progressive tuberculosis is set up in the bovine body by tubercle bacilli subcutaneously injected, is the difficulty of producing the same result by feeding.

Turning now to the effect on animals other than bovine, our results show that the bacillus of bovine tuberculosis, introduced either by injection or by feeding, can set up general progressive tuberculosis in guinea-pigs, rabbits, pigs, goats, cats, dogs and monkeys ; and the list might probably be much extended. It can undoubtedly produce its full effects on animals other than bovine, though more readily on some kinds than on others.

The question naturally presents itself: Is the bacillus of bovine tuberculosis as effective on these other animals as it is in the bovine animal ? Now it is difficult to compare exactly the effects produced in one kind with those produced in another kind of animal. Where the two kinds differ widely in size we may effect an exactitude by using for comparison a unit of body weight, comparing, for instance, the effect of so many bacilli per kilo. of body weight ; but such an exactitude is probably illusory. And in any case the conclusions arrived at on the point in question can only be approximate. The results which we have obtained do, however, point very strongly to the conclusion that the bacillus of bovine tuberculosis is not only as effective, but even more effective, in causing tuberculosis in some of the above animals than in the bovine animal itself. By the fact that very few bacilli, though we do not know the exact limits of paucity, introduced subcutaneously into the body of a guinea-pig will so certainly produce generalised tuberculosis that the experiment may be trusted to test the presence of the bacillus, while many thousands at least are needed to ensure the same result in the bovine animal, cannot be explained by the difference in size between the two kinds of animals, we are driven to the conclusion that the guinea-pig is more susceptible to bovine tuberculosis than is the bovine animal itself. And this conclusion is supported by the fact that the bacillus of bovine tuberculosis given to the guinea-pig by the mouth, usually, or at least often, produced generalised tuberculosis even though the dose was small, whereas in the bovine animal feeding with even relatively large quantities produced as a rule only a limited local tuberculosis. Again, the difference in size between a pig and a calf is quite insufficient to explain the facts that general tuberculosis is much more readily produced by feeding, and that, in subcutaneous injection, a much smaller dose gives rise to generalised tuberculosis in the former than in the latter. A similar conclusion may be drawn from the results obtained with monkeys. All these three kinds of animals—guinea-pigs, pigs, and monkeys—seem to be more susceptible to the action of the bacillus of bovine tuberculosis than is the bovine animal itself.

The bacillus of bovine tuberculosis is not so constituted as to act on bovine tissues only, for it can give rise to tuberculosis in many animals other than bovine ; it is not even so constituted as to act on bovine tissues with a special energy, for it can give rise to tuberculosis in some other animals as readily as, or even more readily than, in bovine animals themselves. We call it the bacillus of bovine tuber-

culosis merely because we find it most frequently in the bovine body, it being the cause of bovine tuberculosis.

The fact that the bacillus of bovine tuberculosis can readily by feeding as well as by subcutaneous injection give rise to generalised tuberculosis in the anthropoid ape, so nearly related to man, and indeed seems, so far as our few experiments go, to produce this result more readily than in the bovine body itself, has an importance so obvious that it need not be dwelt upon.

Human Tuberculosis.

We have studied the nature of the tuberculous material obtained from a large number (now amounting to sixty) of cases of the disease in man.

Our results have led us to divide these cases into two groups, very clearly distinguished from each other by the properties and characters of the bacillus found in each.

Nearly all the cases fall readily into one or the other group, and all the members of each group agree with each other in the features which we are about to describe. But some few cases present exceptional features by which they in one respect or another differ from all the other cases, and it will be advantageous to consider these as forming a group by themselves.

Group 1.

One group, which we will call Group fig. 1, is far smaller than the other, containing only fourteen cases out of the whole number. It will be convenient to consider this group first.

The viruses in this group were obtained in one case from sputum feeding, in three cases from tuberculous cervical glands removed by operation, and in ten cases from the lesions of cases of primary abdominal tuberculosis. All the cases of abdominal tuberculosis occurred in children and showed some distinctive feature demonstrating the primary origin of the disease. In some there was ulceration of the intestine, in others tuberculous peritonitis. All showed caseation of the mesenteric glands. In some cases the patient had died of generalised tuberculosis. In all cases the mesenteric glands were used for investigation, but in some of those in which there was generalisation of the disease, lesions remote from the mesenteric glands were also used, such as those occurring in the bronchial glands, lungs, and the meninges.

The Effect Produced on Bovine Animals.

The Effects of the Subcutaneous Injection of Emulsions.—We will consider first the effects produced by the subcutaneous injection into bovine animals of the tuberculous material of the several cases of this group in the form of emulsions, either prepared directly from the original material or from the tuberculous organs of guinea-pigs infected with that material. Such emulsions were used in ten cases out of the fourteen. In all cases the emulsion was injected into each of two animals, and these were young calves, except in the case of one of the earlier cases studied, in which one of the animals was a heifer.

In all these ten cases the injection gave rise in one or both the animals used to a generalised tuberculosis. The disease so produced

was in four cases a fatal generalised progressive tuberculosis, the animal dying within fifty days, or having to be killed in a dying condition; and this result was obtained in both the animals employed in each case. In one case only one of the two animals employed was affected to this fatal extent. In the other four cases the tuberculosis produced in one or both the animals employed, though generalised and progressive, was not severe enough to be fatal within the period of observation. And in three cases the effect produced in one of the two animals used was not more than a limited retrogressive tuberculosis.

The dose used, *i.e.*, the number of bacilli injected, was in some of the earlier cases not estimated, and varied largely in the others. Hence, putting wholly on one side for the present the question whether the bacilli in the several cases differed among themselves essentially in degree of virulence, that is, in the power to set up tuberculosis, the question naturally presents itself, were the cases of lesser effect due to the dose given being too small in relation to the individual susceptibility of the animal employed?

That this was the explanation is strongly suggested by the fact that in the cases in which the original emulsion produced less than a fatal generalised progressive tuberculosis, this greater effect was seen when the virus was carried on by the subcutaneous injection of emulsions from the animals originally infected to other animals.

The Effect of the Subcutaneous Injection of Cultures.—Definite proof of the above was afforded by the following experience. We have seen that with bovine tuberculosis a large dose, 50 mgrs., of culture injected subcutaneously, produces fatal generalised tuberculosis. Such a dose is, as we have said, large enough to overcome all resistance.

Cultures were prepared from the tuberculous material of each of the above ten cases, and also from that of each of the other two cases in which no emulsions had been used. The material employed for preparing the cultures was either the original material or the tuberculous organs of a guinea-pig or other animal infected with the original material.

In each of the above fourteen cases the subcutaneous injection of 50 mgrs. of culture gave rise to a generalised progressive tuberculosis, the animal dying or being killed when very ill within fifty days; in nine out of the fourteen cases this result was obtained on both the two animals employed in each case; in one of the cases the result in one of the animals employed was less severe.

We have seen that with the bacillus of bovine tuberculosis a smaller dose, 10 mgrs., injected subcutaneously, while it sometimes produced fatal generalised progressive tuberculosis, sometimes gave rise to a less severe result; it would appear that in some calves the powers of resistance, while not great enough to withstand 50 mgrs., are able to withstand 10 mgrs. of the culture. We have tried the effect of a dose of 10 mgrs. of culture in all the cases of Group 1, and the result has been wholly like that obtained with the bacillus of bovine tuberculosis; fatal generalised progressive tuberculosis was sometimes produced and sometimes not.

There can be no doubt, therefore, that the bacillus supplied to us from each of the cases of Group 1 resembles the bacillus of bovine tuberculosis in being capable of producing a generalised progressive tuberculosis in the bovine body when injected subcutaneously.

Other Modes of Injection.—In some few cases of Group 1, the tuberculous material, either the original material or that material "passed" through the body of a guinea-pig, has been injected into the udder of a cow. The result has always been tuberculosis of the udder.

In the few cases in which the tuberculous material of Group 1 has been injected intravenously into a bovine animal generalised tuberculosis has been the result.

Effects on Animals other than Bovines.—We do not think it necessary to dwell in any further detail at present on the features of the effects thus produced by the bacillus of Group 1 on bovine and other animals. We may say definitely and at once that these effects appear to us to be absolutely identical with the effects of the bacillus of bovine tuberculosis. We have wholly failed to discover any essential differences between the one and the other; both are equally virulent, *i.e.*, equally able to set up tuberculosis in bovine and other animals.

GROUP 2.

This group, much larger than Group 1, is made up of forty cases of very different kinds. In some cases the material consisted of cervical glands removed by operation. In eight others it consisted of mesenteric glands removed after death from cases in which the disease seemed to be of alimentary origin, and was either a general tuberculosis or a more localised affection. In others again, ten in all, the material consisted of lungs or bronchial glands from cases in which the disease was of respiratory origin, mainly cases of pulmonary tuberculosis, mostly advanced, though generally in an acute phase. One case was that of a tuberculous kidney, another was that of a tuberculous testis. All the rest, nine in number, were cases of affections of the joints or bones. Our studies of these cases have led us to the conclusion that the bacillus in all of them possessed certain common features.

The Effects Produced on Bovine Animals.

The Effects of the Subcutaneous Injection of Emulsions.—When the bacillus is injected in the form of an emulsion, the effects, as might be expected from what we have seen in connection with the bacillus of bovine tuberculosis, or of Group 1, vary to a considerable extent.

When the emulsion of tuberculous material is lodged in the subcutaneous tissue of the neck the bacilli set up the process of tuberculosis. This proceeds to a greater or less extent, determined by the relation of the virulence—that is to say, the pathogenic powers of the bacilli—to the powers of resistance of the tissues. In all cases the latter, after a varying period, gain the victory; a wall of non-tuberculous tissue surrounding and limiting the central tuberculous mass is formed, the process of tuberculosis in the central mass itself is arrested, the spread of the bacilli from that mass ceases, and the tubercle already formed undergoes calcareous degeneration, or a process of softening. Meanwhile some of the bacilli from the local lesion have invaded the nearest lymphatic gland (prescapular, &c.), probably by way of the lymphatics, and set up tuberculosis there. But here also after a while the powers of resistance of the tissues gain the upper hand, and the tubercle, ceasing to increase, becomes retrogressive and degenerates. Besides the mischief thus set up in

the local lesion and the adjoining lymphatic glands, we observed in nearly half the cases a few scattered tubercles in a retrogressive condition in various organs, such as the lungs, liver, and distant lymphatic glands. In two exceptional cases these scattered tubercles were numerous and conspicuous, but as a rule they were minute, so minute, indeed, that their presence might easily be overlooked. In many cases no such tubercles could be found at all.

We have ascertained experimentally that, as in the case of the bacilli of bovine tuberculosis, when bacilli of this group are injected subcutaneously, in the neck, for instance, in an adequate dose, a certain number enter the blood-stream within two days, and are then distributed all over the body. Groups of them are, in consequence, lodged here and there in various organs. These groups, if the pathogenic powers—that is, the " virulence " of the bacillus—be great enough, start a formation of tubercle; but in all the cases of which we are speaking the resistance of the tissues is great enough to overcome eventually the pathogenic action of the bacillus, the process of tuberculosis is arrested, and the small lesion which has already been formed becomes fibrous and calcareous, or disappears.

The Effect of the Subcutaneous Injections of Cultures.—In the foregoing experiments with emulsions the dose was, in some cases, undetermined, and in other cases small. Hence the absence of a severe effect might be attributed to the dose being too small. We have, therefore, in all the above cases, studied the effects of the subcutaneous injection of a measured dose of culture, and we have purposely chosen a very large dose, namely, 50 mgrs., or, in some cases, a still larger dose, so as to bring out clearly the maximum effect of the bacillus. The cultures used, grown on serum, were twenty-one days old. The results have been far more constant than have been those obtained with the emulsions. In spite of the very large dose, in no case has the injection of a culture given rise to more than a limited retrogessive tuberculosis ; to a circumscribed retrogressive local lesion, very frequently softened in the interior ; to a retrogessive tuberculosis of the nearest lymphatic glands, and to a few small scattered retrogressive tubercles in various organs. And in some cases no such scattered tubercles could be found. We have also given much larger doses (in two cases as much as 3,000 mgrs.) of cultures grown on serum, glycerine-serum broth, or glycerine broth, without producing results more severe than the above.

In all the cases of Group 2, therefore, the bacillus, even given as a culture in very large doses, did not produce generalised progressive tuberculosis when injected subcutaneously into bovine animals. This result was obtained not only with tuberculous material supplied from cases of phthisis and other pulmonary diseases, with tuberculous material supplied from cases of joint and bone affection, but also with tuberculous material supplied as mesenteric and cervical glands—that is to say, from cases in which, presumably, the infection took place by way of the alimentary canal, cases so far similar to those which furnished Group 1.

It is obvious that the bacillus of the cases forming Group 2 differs sharply and clearly from the bacillus of the cases forming Group 1, in that the former does not even in very large doses (50 mgrs. of culture) produce in the bovine body generalised progressive tuberculosis,

while the latter does this always in these doses, and may do it in much smaller doses.

Effects on Other Animals.

Guinea-pigs.—The bacillus of Group 2 readily produces generalised progressive tuberculosis in these susceptible animals. As in the case of bovine tuberculosis and the tuberculosis of Group 1, we have constantly made use of these animals for the purpose of continuing the virus and obtaining material for our experiments.

Pigs and Goats.—Our observations on the effect of injecting the bacillus of Group 2 are not yet completed, but so far they show that this bacillus is not able to produce generalised progressive tuberculosis in these animals, which appear to be as resistant as bovines and rabbits.

Monkeys.—Observations which we have made on these animals show that the injection of the bacillus of Group 2 readily produces in them generalised progressive tuberculosis.

Anthropoid Apes.—We have obtained this result also with the anthropoid ape, namely, the chimpanzee.

Feeding Bovine Animals with the Sputum of Cases of Human Tuberculosis.

We chose as material the sputum of cases of phthisis, and fed for some considerable time two sets of animals with sputum of this kind obtained from a hospital. In the first experiment we fed two heifers (not calves) with a daily dose of sputum, one for about two hundred, the other for about three hundred days; each, therefore, must have received into the alimentary canal a very large number of bacilli.

In one heifer (11) several mesenteric and a few hepatic glands were found to be tuberculous, caseous, and calcareous; these were the sole tuberculous lesions present. We thus obtained by feeding with the bacillus present in human sputum a tuberculosis limited to the structures directly connected with the alimentary canal, a result similar to that which we obtained by feeding calves with the bacillus of bovine tuberculosis. The disease in heifer 11, was, however, markedly retrogressive.

An emulsion (the number of bacilli present not being estimated) from these glands injected subcutaneously into a calf, gave rise to a tuberculosis which, though general and severe, was not fatal. Emulsions from various lymphatic glands of this second animal injected into six calves subcutaneously, intravenously, and intraperitoneally, gave rise to a generalised progressive tuberculosis, fatal in the two injected intravenously, but not in the others within the ninety days which we had taken as our period of observation.

In the other heifer (13) tuberculosis of the mesenteric glands in the form of calcareous nodules, that is to say, in a stage of retrogression somewhat more advanced than the tuberculosis of heifer 11, was found after death. An emulsion from these calcareous glands, containing so few bacilli that none could be detected on microscopical observation, injected subcutaneonsly into a calf (111), gave rise to a very limited retrogressive tuberculosis, namely, to a small nodule in the prepectoral gland, the prescapular gland showing no visible tuberculosis, though an emulsion from it produced generalised tuberculosis in a guinea-pig.

That these limited results were not due to paucity of bacilli alone is shown by the fact that a culture derived from a guinea-pig infected with material from calf 111 in a dose of 50 mgrs., produced in each of two calves not more than a limited retrogressive tuberculosis. We seem, therefore, by feeding to have introduced into the tissues of the bovine in the case of heifer 11 a bacillus of the virulence of Group 1, and in the case of heifer 13 a bacillus of the virulence of Group 2.

In a second experiment four calves were fed, one for ninety-one, the other for 120 days, with sputum similar to that used in the first experiment, one receiving about 21,000 cc., the other about 30,000 cc. In each animal a limited retrogressive, calcareous tuberculosis was found in the mesenteric or adjoining glands; in some the pharyngeal glands were also affected. These results indicated the presence in these calves of a bacillus of the lesser virulence of Group 2.

THE ANATOMICAL AND HISTOLOGICAL FEATURES OF THE TUBERCULOSIS SET UP BY THE BACILLUS OF HUMAN TUBERCULOSIS AND BY THE BACILLUS OF BOVINE TUBERCULOSIS.

In each experiment which we have made the anatomical features of the disease set up have been carefully observed and recorded.

We may say at once that the effects of the bacillus of Group 1 are, in respect to anatomical and histological features, absolutely identical with those of the bacillus of bovine tuberculosis. And this is true, whether the effects on the bovine animal itself or on any other animal are studied. Further, the disease produced artificially in the bovine animal by the injection of, or feeding with, the bacillus of bovine tuberculosis, or that of Group 1, is in every respect identical with the tuberculosis occurring naturally in that animal.

The effects on the bovine animal produced by the subcutaneous injection of the bacillus of Group 2 present, on the other hand, a marked contrast to those produced by the bacillus of bovine tuberculosis. The limited circumscribed retrogressive local lesion, the limited retrogressive, or at least non-progressive, lesions in the adjacent lymphatic glands, the occasionally-found scanty, minute, disseminate tubercles, in a distinctly retrogressive condition; all these features offer so strong a contrast to the usual effects of the bacillus of bovine tuberculosis as to suggest that the action of the one bacillus differs in kind from that of the other.

But as we have seen, in certain cases, owing to the smallness of the dose, or to the unusual resistance of the tissues of the animal employed, the effects produced by the bacillus of bovine tuberculosis fall short to a varying extent of what we have called the full effects, and in some of these cases the effects are, anatomically, identical with those of the bacillus of Group 2, consisting as they do of a circumscribed retrogressive local lesion and scanty, retrogressive, disseminate tubercles. Histological investigation discloses, moreover, a like histological identity. The histological features of the disseminate tubercles produced by the bacillus of Group 2 through the initial distribution, are the same as those of the disseminate tubercles of like extent and phase produced by the bacillus of bovine tuberculosis.

The essential identity of the action of the bacillus of Group 2 with that of the bacillus of bovine tuberculosis, is further illustrated by the histological study of the initial changes following immediately

upon subcutaneous injection and of the subsequent events in the two series.

In each of them the pathogenic processes resulting from the struggle between the bacillus and the tissue are fundamentally the same. The differences in the effects are determined by the relation of the virulence of the bacillus to the resistance of the tissues. The contrasts so marked between the two series are simply the qualitative expressions of quantitative differences of virulence. There is no evidence of difference in kind between the action of one bacillus and that of the other.

A much more ample opportunity, however, of comparing the anatomical and histological features of the tuberculosis set up by the bacillus of Group 2 with those of the tuberculosis set up by the bacillus of bovine tuberculosis, is afforded by the fact that both of them will set up generalised progressive tuberculosis in guinea-pigs and monkeys.

When we compare the broader anatomical features of the disease set up in the monkey by the bacillus of Group 2 with those of the disease set up by the bacillus of bovine tuberculosis, we find no essential difference between the two, and that whether the bacillus be injected into the tissues or introduced by feeding through the alimentary canal. The progress of the invasion, the course of the pathological events and the effects produced, are essentially the same. Nor has the most careful study of the more minute histological features of the lesions succeeded in disclosing any essential differences. The disease set up in the monkey by the bacillus of Group 2 is essentially the same disease as that set up by the bacillus of bovine tuberculosis.

And what in this respect is true of the monkey is also true of the guinea-pig. The tuberculosis set up in these animals is, so far as anatomical and histological features are concerned, identical, whether it be set up by the bacillus of bovine source or the bacillus of Group 1 or Group 2 of human source.

Taking all these several facts into consideration, we feel justified in asserting that, regard being had to the differences which present themselves according to the extent of disease produced and the phase in which the disease exists at the time of examination, the tuberculosis set up by the bacillus of human source is, so far as its anatomical and histological features are concerned, one and the same as the tuberculosis set up by the bacillus of bovine source.

Summary of the Effects of the Bacillus of Tuberculosis.

It is clear that the effects produced by the introduction of the bacillus from the cases of human tuberculosis forming Group 1 are in every respect one and the same as the effects produced by the introduction of the bacillus of bovine tuberculosis.

But it is no less clear that the effects produced by the introduction of the bacillus of Group 2 of cases of human tuberculosis are in one respect markedly different.

The bacillus of Group 2 is far less virulent than the bacillus of bovine tuberculosis; it is so much less virulent that, even in very large doses, it does not set up generalised progressive tuberculosis in the bodies of bovines and rabbits. When injected subcutaneously, its

virulence is unable to overcome the "powers of resistance" of these animals, and these powers either soon arrest the progress of any tuberculosis which may have begun, and make the disease retrogress, or (in some few cases) prevent the disease being set up at all.

As will be seen later, in some of the cases in Group 3 we have met with intermediate degrees of virulence.

We repeat that our observations are not at present sufficiently numerous to justify us in making a decided statement; but, so far as they go, they seem to show that the bacillus of bovine tuberculosis is more virulent towards guinea-pigs and monkeys than the bacillus of Group 2. And this, at all events, we are able to say, that in all our experience we have met with no instance in which the former bacillus has distinctly proved less virulent than the latter. We have come across no clear indication that the difference between the two is one of kind.

In all its essential features the disease set up by the bacillus of bovine tuberculosis is identical with that set up by the bacillus of Group 2. Such differences as are met with are differences of amount and phase only.

With regard to the first part of our enquiry, then, that relating to the effects of the bacillus of bovine and human tuberculosis, we find that these are one and the same, save that those of Group 2 of human tuberculosis are markedly less in degree.

All our results, in fact, point to the conclusion that the bacillus of bovine tuberculosis has sufficient virulence to produce easily its full effect on the more resistant bovine and rabbit, as well as on other less resistant animals, while the bacillus of Group 2 of human tuberculosis, being essentially less virulent, is not able to produce its full effect on the more resistant bovine and rabbit, though it can produce them on the less resistant guinea-pig, monkey, and, we may add, man.

The Tubercle Bacillus.

The bacillus of tuberculosis is a simple organism with scanty microscopical features, growing with varying ease or difficulty on various media. The microscopical features of the bacillus itself, and the changes which it brings about in the medium on which it is growing, are correlated to, and seem dependent on, the nutritive powers of the bacillus; in this respect the bacillus of tuberculosis resembles other similar simple organisms. This difference in nutritive, and so in reproductive, power, is the essential difference between one bacillus of tuberculosis and another, the other differences described above being dependent on it; and this difference enables us to arrange all the bacilli which we have studied into two classes: one in which the bacillus grows with difficulty on artificial media, and which we call *dysgonic*, and another in which the bacillus grows readily on the same media, and which we call *eugonic*.

In the first class we place the bacillus of bovine tuberculosis and the bacillus of Group 1 of human tuberculosis. These exhibit the same range of growth on various media, and the same correlated variations in microscopical features. They are in all respects one and the same.

In the second class we place the bacillus of Group 2 of human tuberculosis, but the demarcation between these two classes is not a

sharp or broad one. The members of the former class are not equally dysgonic, nor are those of the latter equally eugonic. In each of them there is a wide range of growth, so wide in each class that the least dysgonic of the former differs slightly, if at all, from the least eugonic of the latter class. And there is a similar closeness in the other features correlated to the power of growth. Hence the difference between the two classes, that is between the bacillus of Group 2 of human tuberculosis and the bacillus of bovine tuberculosis (or of Group 1 of human tuberculosis) is one of degree only, and moreover, when the extremes of the two classes are compared the one with the other, is seen to be a slight one.

Bovine and Human Tuberculosis Compared.

We are now in a position to attempt a direct answer to the question, Are human and bovine tuberculosis one and the same? It is obvious, however, from what has gone before, that in attempting the answer we must deal separately with the human tuberculosis of Group 1 and that of Group 2.

Group 1.—The results relating to this group, recorded in foregoing paragraphs, show beyond all doubt that the tuberculosis occurring in the cases forming this group cannot, either by the effects brought about when the bacillus is introduced into the bodies of bovine or other animals, or by the cultural and other characters of the bacillus itself, or, indeed, in any other way, be distinguished from bovine tuberculosis, that is to say, from tuberculosis occurring naturally in the bovine animal. We may go a step further.

The tuberculous material of Group 1 was supplied to us in the form of mesenteric or cervical glands; and when the details of the several cases are studied, it seems clear that the bacillus found an entrance into the body by way of the alimentary canal, through absorption from the fauces (cervical glands) or from the intestines (mesenteric glands). Now the spread of tuberculosis from man to man is generally held to take place mainly through the respiratory passages. The bacillus is thrown off from the body of man mainly with the sputum, and through the sputum gains access to the human body chiefly in the inspired air, by the channel of the respiratory passages. Some of these air-borne bacilli may, it is true, be absorbed from the fauces before they can reach the respiratory passages proper; and bacilli of human source may, in various ways, contaminate human food, and be absorbed from the intestine; but it is generally considered that the amount of infection which takes place by these means is not great.

Very different are the conditions determining the entrance into the body of bacilli coming from a bovine source. The opportunities for the transmission to the body of man by the respiratory passages of the air-borne bacilli coming from the lungs of a tuberculous cow are insignificant compared with the abundant opportunities for the transmission to man, by the fauces or by the intestine, of tubercle bacilli present in cows' milk. We are therefore led to a conclusion from which there seems to be no escape, not only that the tuberculosis which was present in each of the cases of Group 1 was identical in all its features with bovine tuberculosis, but also that the bacilli actually came from a bovine animal; the tuberculosis was bovine tuberculosis implanted in a human body.

In three of the cases in which we obtained tuberculous mesenteric glands, we were able to study, not only the mesenteric glands themselves, but also tuberculous lungs and other organs; and the results obtained from these other tuberculous organs were identical with the results obtained from the mesenteric glands; the tuberculosis in all the affected organs was the same bovine tuberculosis, one form only of bacillus having been found. The bacilli of bovine source had not only attacked the mesenteric glands to which they had been brought directly by absorption from the alimentary canal, but had also invaded distant organs, being carried thither by the blood stream or the lymphatics. We may conclude beyond doubt that the whole disease was caused by the same bovine tubercle bacilli; the children died of bovine tuberculosis caused by bacilli introduced by way of the alimentary canal, and probably conveyed through cows' milk.

In each of the other cases we have been able to study the nature of the tuberculosis in the mesenteric glands only. We are unable to make a positive statement as to the nature of the tuberculosis in the other diseased organs. But in our study of these other cases we have met with no facts which would prevent us drawing the conclusion that these cases, inasmuch as they agree with the above three cases in all respects in which we have studied them, agree also in this, that the whole disease was caused by a bacillus coming from a bovine source.

We are thus able to give a positive answer to the second term of our reference. The human body can be infected by bovine tuberculosis. Moreover, the results which we have recorded in preceding paragraphs show that the bovine body can be infected by tuberculosis of human source, in some cases to a complete, in others to a limited extent; bovine animals and man can be reciprocally infected.

Group 2.—We have seen that a most marked difference in "virulence" obtains between Group 2 and Group 1; even in very large doses the bacillus of Group 2 does not set up generalised progressive tuberculosis in the bovine animal. But we have also seen that this difference, great as it appears to be, is a difference of degree only; for the pathological changes which constitute the disease called tuberculosis can be set up to a certain extent in the bovine tissues by the bacillus of Group 2. The changes brought about by the bacillus of Group 2 and by the bacillus of Group 1, are at the outset of their respective actions one and the same; it is in the sequent changes that the difference is manifested; apparently the weaker bacillus of Group 2 is soon overcome by the resistance of the tissues, while the stronger bacillus of Group 1 goes on to bring about the further changes constituting progressive tuberculosis.

But while the difference in virulence between Group 1 and Group 2 is a very marked one, creating a broad gap between the two, the difference in cultural characters is, so to speak, a vanishing one. The bacilli of the several cases of Group 1 differ widely among themselves as to the readiness with which they grow on artificial media, as do also and almost equally the bacilli of the cases of Group 2, so that the difference between the least dysgonic of Group 1 and the least eugonic of Group 2 is almost an imperceptible one.

It is a matter of common bacteriological, or rather biological, experience that simple micro-organisms, similar to the bacillus of tuberculosis, when growing either in living tissues or on artificial media may,

in certain cases, be so influenced by their environment that, after a longer or shorter time, their characters and properties are changed. Pathogenic organisms may, in this way, lose or gain in virulence. Bacteriological experience furnishes us with many examples of a pathogenic organism being lowered or raised in virulence, and at the same time modified in its other characters, by being cultivated in the living tissues of this or that animal, that is to say, by being "passed" through the body of this or that animal. In such cases the organism remains "one and the same," but it is changed in virulence and often in other characters.

Now, compared with many other pathogenic micro-organisms, the bacillus of tuberculosis (whether of human or bovine source), is a very stable organism; it does not so readily exhibit changes in its characters as do many other pathogenic micro-organisms. Our own experience has given us many instances of this stability. We have, again and again, had occasion to "pass" a virus through a considerable number of animal bodies, and to observe that it was not thereby changed either in virulence or in cultural characters. Again we have, by repeated "sub-culturing," often maintained virus in the form of a culture for a long time, for many months, and found that it was not modified by cultivation either in virulence or cultural characters. But this stability, though great, may not be absolute, and we are thus led to the question, May the bacillus of bovine tuberculosis on the one hand, and the bacillus of human tuberculosis on the other hand, exhibit instability under certain conditions?

May, for instance, the bacillus of bovine tuberculosis be so subjected to the influences of some environment as to be modified in its properties, to lose in virulence and to gain greater power to grow on artificial media? May the bacillus of human tuberculosis be similarly modified so as to gain in virulence, and lose its so-called "saprophytic" power, its power to grow on artificial media? In other words, may the bacillus of bovine tuberculosis, by cultivation in living tissues, by "passage" through some animal body or bodies, or in other ways, be transformed into the bacillus of human tuberculosis, and *vice versâ?*

These questions bring us to the consideration of tuberculosis in man, yielding exceptional results, which we have placed in a group by themselves.

Group 3.

We have placed these cases in a group, but they do not form a group in the sense in which the cases of Group 1 and Group 2 form a group.

In Group 1 and Group 2 the cases in each group differ so little from each other as to form an almost homogeneous group; in Group 3 the cases differ widely from each other; we simply group them together for consideration on account of their exceptional features. Were it not for these exceptional features some might be placed in Group 1, others in Group 2. We have placed in this Group 3 three cases in which we obtained certain results when the virus was "passed" through a series of calves in succession. We have placed them in this group for this reason only; but for this they would have been placed in Group 2.

In one case the tuberculous material, namely, tuberculous synovial

membrane removed from the knee-joint of an adult, when injected subcutaneously into two calves, gave rise to a limited retrogressive tuberculosis. A culture obtained from the affected organs of one of these two calves was very distinctly eugonic; and a culture obtained from the organs of a guinea-pig inoculated with the original material, when injected subcutaneously into calves in a dose of 50 mgrs., and intraperitoneally into rabbits in a dose of 10 mgrs., gave rise to a limited retrogressive tuberculosis. The bacillus in this case clearly belonged to Group 2. When, however, this material was passed in succession by subcutaneous injections through a series of calves, emulsions of the organs of the animals of the fifth and sixth passages gave rise to a generalised progressive tuberculosis, and cultures obtained from these organs gave rise in calves and in rabbits to fatal progressive tuberculosis. These cultures, moreover, were highly dysgonic. One of them, indeed, was one of the most dysgonic obtained by us from a human source. The bacillus then present in the organs of these calves, infected after a number of "passages," presented all the characters of the bacillus of bovine tuberculosis.

In each of the three cases the bacillus of the tuberculous materials made use of either actually presented, or may be assumed to have possessed, at the beginning, the characters of the bacillus of Group 2, highly eugonic and of lower virulence; but after "passage" through bovine bodies, presented the characters of a bacillus of bovine tuberculosis, highly dysgonic and very virulent.

In the cases then which we have put together in Group 3, and in the cases of feeding with human sputum, we have met with the following:—

(*a*) Bacilli of a character intermediate between Group 1 and Group 2.

(*b*) Replacement of a eugonic bacillus of low virulence by a dysgonic bacillus of high virulence ("passage" experiments).

(*c*) Indications of instability in virulence and cultural characters, and of want of accordance between virulence and cultural characters.

In all which has been recorded above we have limited our inquiry to the identity of human and bovine tuberculosis, but the results at which we have arrived point very strongly to the necessity of extending our studies to the tuberculosis occurring naturally in animals other than man and the ox. We have already made observations with this intent, and have especially directed our attention to the tuberculosis so common in pigs, a matter of great practical importance.

We propose to report on a future occasion concerning this and other matters entailed by the terms of our reference.

Conclusion.

We may briefly sum up the bearings of the results at which we have already arrived as follows:—

There can be no doubt that in a certain number of cases the tuberculosis occurring in the human subject, especially in children, is the direct result of the introduction into the human body of the bacillus of bovine tuberculosis, and there also can be no doubt that in the majority at least of these cases the bacillus is introduced through cows' milk. Cows' milk containing bovine tubercle bacilli is clearly a cause of tuberculosis, and of fatal tuberculosis, in man.

Of the sixty cases of human tuberculosis investigated by us, fourteen of the viruses belonged to Group 1, that is to say, contained the bovine bacillus. If instead of taking all these sixty cases, we confine ourselves to cases of tuberculosis in which the bacilli were apparently introduced into the body by way of the alimentary canal, the proportion of Group 1 becomes very much larger. Of the total sixty cases investigated by us twenty-eight possessed clinical histories indicating that in them the bacillus was introduced through the alimentary canal. Of these thirteen belonged to Group 1. Of the nine cases in which the cervical glands were studied by us, three, and of the nineteen cases in which the lesions of abdominal tuberculosis were studied by us, ten belong to Group 1.

These facts indicate that a very large proportion of tuberculosis contracted by ingestion is due to tubercle bacilli of bovine source.

A very considerable amount of disease and loss of life, especially among the young, must be attributed to the consumption of cows' milk containing tubercle bacilli. The presence of tubercle bacilli in cows' milk can be detected, though with some difficulty, if the proper means be adopted, and such milk ought never to be used as food. There is far less difficulty in recognising clinically that a cow is distinctly suffering from tuberculosis, in which case she may be yielding tuberculous milk. The milk coming from such a cow ought not to form part of human food, and indeed ought not to be used as food at all.

Our results clearly point to the necessity of measures more stringent than those at present enforced being taken to prevent the sale or the consumption of such milk.

(Mr. W. H. Power, C.B., F.R.S., F.R.C.S., Medical Officer of the Local Government Board, has been appointed Chairman of the Royal Commission in the room of the late Sir Michael Foster, K.C.B.)

Personal.

Amongst those recently elected to the honour of Fellowship of the Royal Society of Edinburgh, are the names of two members of the veterinary profession, Mr. J. A. Gilruth and Mr. Wm. Robertson. The former occupies the position of Bacteriologist and chief Veterinary Adviser to the New Zealand Government, and the latter is the Director of the Veterinary Laboratory at Grahamstowa, South Africa.

In the recent Point to Point Steeplechases of the 7th Dragoon Guards, Mr. F. C. Gillard, M.R.C.V.S., a well-known Kentish Veterinary Surgeon, came in fourth out of a large field of starters; and a few days ago, out of twenty-one starters with the Shorncliffe Dragoon Hunt Point to Point he was third. For the last two consecutive years Mr. Gillard has, with the help of a little well-bred hunter mare named "Half Fit," captured the Silver Cup of the Ashford Valley Hunt.

Amongst the successful candidates during the recent Municipal Elections, we are pleased to note the name of Mr. E. Lionel Stroud, F.R.C.V.S., the esteemed Editor of one of our well-known professional papers, the *Veterinary News*. Mr. Stroud is evidently very much appreciated and very popular in his own district, for in the East Ward of the Southall-Norwood Urban District Council Election his name came out at the head of the poll.

BELGIUM.

By a Royal Decree dated August 6, 1906, the course of study at the Brussels Veterinary School has been reorganised, the number of terms being increased from seven to eight.

Article 3.—The year is divided into two terms, the first commencing on the first Tuesday in October, and the second on March 1. The students are divided into four classes, the course of instruction being:—

(*a*) *First Class.*— Theoretical. — Systematic and comparative anatomy of the domesticated animals; histology; embryology; physiology; physiological chemistry. Practical:—Dissection; histological demonstrations; physiological chemistry.

(*b*) *Second Class.* — Theoretical. — Pharmacy; topographical anatomy; general pathology, comprising pathological anatomy and chemical analysis as applied to clinical medicine; bacteriology; parasitology; therapeutics; toxicology; points of animals. Practical:—Dissections; practical pharmacy and therapeutics and compounding, &c.; microscopic pathological anatomy; bacteriology; parasitology; clinical medicine.

(*c*) *Third Class.*— Theoretical. — Medical pathology; surgical pathology; "junior" contagious diseases and sanitary police; zootectomy; hygiene and principles of agriculture; "junior" operative medicine; shoeing. Practical:—External anatomy and points of animals; pharmacy; pathological anatomy; clinical demonstrations.

(*d*) *Fourth Class.*—Theoretical.—Surgical pathology; "senior" zootectomy; hygiene and principles of agriculture; "senior" medical and commercial law; obstetrics; meat and food inspection; dentistry. Practical:—Operative medicine; obstetrics; pharmacy; pathological anatomy and chemistry; demonstrations and excursions in zootectomy; demonstrations and excursions in meat and food inspection; clinical medicine and surgery.

In addition, the third class students have to go through a course of sixty lessons in riding.

(*Revue Générale de Médecine Vétérinaire.*)

Reviews.

Surgical and Obstetrical Operations. By W. L. Williams, Professor of Surgery and Obstetrics in the New York State Veterinary College, Corneli University. Second Edition, Revised. Pp. 230 + x. Illustrations, 39 plates, 14 figures. Published by Baillière, Tindall and Cox, London. Price 10s. 6d net.

This is one of the most useful little books that it has been our good fortune to meet with recently, useful both to students and practitioners alike. The subject is treated on the same system as by Dr. Pfeiffer in his little work, much of which is embodied in the present volume.

The author first gives a short introductory chapter dealing with the preparation of the subjects for operation and the sites to be operated upon, thus obviating the necessity for repetition when dealing with the

individual operations. The work is then divided into two parts, the first treating with surgical operations proper, and the second with obstetrical operations. The first part is subdivided into four sections, respectively dealing with operations on the head, neck, trunk and genital organs, and on the extremities. The author does not consider it advisable to confuse the student with a lot of different operations designed to relieve the same condition, and so only includes one operation for each condition, and that the one which he has found by virtue of a long and varied experience to be the most useful. In Pfeiffer's original edition there is a short introductory note by Professor Fröhner referring to the special advantages of such procedure. Professor Fröhner wrote, "The multiplication of methods confuses the beginner readily; as an important lesson in operative instruction the student must become thoroughly acquainted, among other things, with *one* method with which he becomes so familiar that he can rely upon it with perfect trust in practice." We have no hesitation in endorsing these sentiments, which apply equally well to the practitioner if he is to be successful. The descriptions of the operations are very lucid and for the most part free from ambiguity, although the author commits the error which we have previously drawn attention to in other works of the same nature. In referring to the head, he uses the terms anterior, inferior, &c., without first indicating whether for the purposes of description the long axis of the head is to be considered in the vertical or horizontal position. Hence, when he suggests making a curved incision along the "antero-inferior border" of the masseter muscle, the reader is at first at a loss to know what is meant. Again, we notice references to "the *lateral* side" of a molar tooth, when the author means "the *outer* side." Surely both inner and outer sides are lateral.

Excellent chapters are present on ovariotomy of the mare, cow and bitch, and students should feel fairly confident of success in these operations if they followed the instructions given. In the case of the bitch the author describes the operation both in the flank and on the middle line. In the latter case, however, we consider that the site indicated is too far back, viz:—"4 cm. long, beginning just in front of the pelvic brim." That position, however, would be right if hysterectomy were being performed, but that operation is unfortunately omitted.

The part devoted to obstetrical operations is condensed into thirty pages, equally divided into text and illustrations. The text is very lucid and to the point, and will be found to contain valuable hints even to experienced practitioners. For example, the author points out that some obstetrists have found difficulty in applying traction to the inferior maxilla by means of a cord, and gives the following method by which that difficulty may be overcome. "First make a perforating wound with the knife between the rami of the lower jaw, then carry the looped cord over the jaw and push it beyond the perforating incision with the loop resting within the mouth, and finally pass the free end of the cord through the perforation from the buccal cavity outwards, and drawing upon this the inferior maxilla is so engaged that it will permit the application of powerful traction."

There are few printer's errors which have escaped correction, *e.g.*, sca(*l*)pel (p. 9), hyoyertebrotomy (p. 58), instrumens*t* (p. 65), arytenect*on*omy (heading, p. 65).

The illustrations are excellent for the most part, and of much assistance in following the text, and they are very well reproduced.

We have no hesitation whatever in recommending the book both to students and busy practitioners.

The work of the publishers is in their usual good style.

THE RETRIEVER. By F. T. Barton, M.R.C.V.S. Pp. 120 + ix. Ten illustrations from photographs. Published by Everett and Co., London. 3s. 6d. net.

THIS little book deals with the points, management, training and diseases of the retriever. The first portion contains some very interesting reading, and the points of conformation of retrievers in general are very well described in Chapter II., while the special features of the flat-coated retriever, the Labrador, and the curly-coated variety are dealt with in Chapters III., IV. and V. respectively. Some useful hints on the breaking of retrievers are given in Chapter VIII., along with information regarding the liability of breakers and trainers. The latter portion of the book concerns the veterinary profession more particularly, about seventy pages being devoted to descriptions of diseases of dogs and *their treatment.* We have no hesitation in saying that the author has overstepped the line of discretion in these matters, although undoubtedly in a few instances he recommends calling in professional assistance. For instance, in referring to injuries to the feet the author says:—"Fistula or 'whitlow' of the claw very frequently follows injuries to the toe. When examined, either a small boil will be seen, or else a minute hole leading to within the claw. Rest, linseed poultices, and opening up of the fistulous sore are necessary in order to effect a cure. Put on a boot." Now we submit that such a description is likely to do much more harm than good to all concerned. Laymen will imagine that they can easily treat such cases successfully, and the dog will undoubtedly suffer considerably more when tampered with by the unskilled operator than if professional aid had been called in at once. There are numerous examples where amateur treatment will be resorted to as the result of the author's efforts, in which the unfortunate dogs will eventually have to be put under professional care. It is certainly both cruelty to animals and unfair to the veterinary surgeon, the latter being severely handicapped, so far as successful treatment goes, by the advanced condition to which the disease has arrived when he is eventually called in. The author also appears to forget that successful treatment depends on successful diagnosis, and he goes into some detail as to treatment of gastritis, indigestion, dysentery, &c. But we ask, "When is the amateur to know that he is treating for the right complaint?" It is the poor unfortunate dog that has to pay the penalty, and not, as we should be almost constrained to wish, the amateur who has attempted the treatment or the author who has afforded the amateur his basis for treatment. In these cases a little knowledge is often very dangerous. What would the examiners of the R.C.V.S. do with a student who was responsible for the following? "To cure dysentery, give from 5 to 10 gr. of ipecacuanha combined with a grain of calomel two or three times a day." Who would give 10 gr. of santonin to a dog? Such advice speaks for itself.

As a literary effort, the book is disappointing, especially with regard to punctuation. Here are two examples:—(*a*) "Owners of stud-dogs, do, if the animals' services are in much demand, receive a number of visits without the senders' being able to send someone, or attend themselves,

in order to see that the bitch is served in accordance with arrangements"; and (*b*) "By the term 'eczema' we mean either a localised, or a generalised, superficial congestion or inflammation of the epidermal tissues, arising from chemical, mechanical, or parasitic causes."

The publishers' share of the work is very good, and that applies especially to the illustrations.

Translations and Extracts.

THE DANGER OF CASTING HORSES WHEN SUFFERING FROM, OR CONVALESCENT FROM, SORE THROAT.

BY M. LEON DUPAS, VETÉRINAIRE EN 2ME., 31RE REGIMENT ARTILLERIE.

IT is often the practice to postpone operations that are not of an urgent nature until the animal has to be placed on the sick list for some complaint that prevents his working. This is done with the object of saving time, in fact, to "kill two birds with one stone." This practice is not without danger, as the following case will show.

The patient, which was very fat, and not in good condition, had been treated for some days for acute catarrhal sore throat, from which he had almost recovered, and advantage was taken to remove an old-standing capped elbow.

The animal was thrown, and the off fore limb, the one on which the tumour was situated, was removed from the hobble and drawn forwards, while the others were drawn backwards, so as to expose the tumour. The tumour was removed without difficulty, but whilst the operation wound was being sutured the animal began to struggle violently, and broke the hind hobble. The limb was secured with a side line, but he still continued to struggle so hard that the sutures were only passed with difficulty, and all of a sudden the respirations began to get loud and whistling. The hobbles were at once removed and artificial respiration used, but the roaring increased, the nostrils became dilated to their fullest extent, the mouth opened and shut convulsively, and the tongue, which was congested, hung out of it. The eyeballs rolled in a convulsive manner in the orbits, and the conjunctivæ became blue; in fact, the patient was asphyxiated, and tracheotomy had to be at once performed. This gave relief to the urgent distress, and the patient got on his feet, was wiped down, dried, put into a loose box, and made comfortable. The respirations became normal, the tube was removed next day, the operation wound healed up, and the animal discharged cured in about a fortnight. What happened can only be guessed at, as the horse was not a roarer, and had never made a noise since the mishap in August, 1905; it is only natural to conclude that there was either a spasm of the larynx or contraction of the throat. It is quite possible that these were of a reflex nature, originating from the congested state of the mucous membrane of the larynx and pharynx, which was increased by the inclined position of the head when the horse was down. Whatever the cause was, the practical lesson is that it is dangerous to throw horses that are suffering from, or are recovering from, any acute affection of the upper air passages.

Revue Générale de Médecine Vétérinaire.

ABSCESS OF THE SPLEEN CAUSED BY AN INJURY.

BY HERR RITCHER.

THE animal met with an accident, and low down on the left side of the abdomen there was a wound about the size of a shilling, which discharged several drops of pus, the surrounding tissues being hot and swollen. When examined, the probe came in contact with a hard substance that seemed to be the abdominal tunic. The suppuration gradually decreased, but after three weeks the temperature rose, and the condition became less satisfactory. The fistula was explored, and a slough was found at the bottom, which was removed. Several other blind fistulæ were discovered running off from it; these were laid open and curetted. The wound appeared to go on well till the fifth day, when there was another rise in the temperature; the discharge increased, the appetite became bad, and an abscess formed behind the fistula. This was opened and emptied, when the temperature again fell, and the general condition improved. The horse did well for about six days, when symptoms of general infection set in. He gradually got worse, and died the sixth week after the injury had been first inflicted.

On *post-mortem* examination the spleen was found to be firmly adherent to the abdominal walls, red in colour, with the edges rounded, swollen, and hard, measuring 90 by 52 by 7 centimetres, with the vessels engorged with blood. In the portion adhering to the abdominal wall there was a large abscess communicating with the interior and a number of smaller ones in the substance of the organ. It was not decided whether the spleen had been injured or if the abscess was secondary, following on necrosis of the abdominal walls.

(*Zeitschrift für Veterinarkünde.*)

PARASITIC ANEURISM WITH SECONDARY THROMBOSIS.

BY PROFESSOR ZWAENEPOEL, BRUSSELS.

THE animal, a foal, was found in a most distressed condition after having travelled about eight kilometres. The membranes were blanched, the pulse quick and weak, respiration slow and shallow, with a yellow, fœtid diarrhœa, followed by constipation. About the tenth day afterwards he could not stand, and if made to do so, with difficulty. It was impossible to advance the near fore or off hind legs. The animal died from a violent attack of colic. The spleen, which weighed ten kilogrammes, contained a slough the size of a man's head, and the splenic artery was completely obliterated with a thrombus. The walls of the stomach were atrophied by pressure of the spleen, and much congested. The small intestine was congested and covered with patches of ecchymosis, and the mucous membrane of the large intestine was black, friable, and engorged with blood. In its thickness it contained a large number of small tumours that contained the larvæ of sclerostomes—the cæcum in particular was involved. Thrombi existed in many of the arteries, the clot in the large mesenteric was of old standing, softened in places and adherent; the one in the aorta was more recent and only adhered in places. The axillary, left humeral, radial, and right

femoral and popliteal arteries were altogether obliterated, and thrombi were also found in the renal, hepatic, and splenic arteries.

These lesions explained the symptoms; from the suppression of the functions of the stomach the food was undigested and caused diarrhœa, and the sudden attack of paralysis is explained by the obliterations of the arteries that supply the parts, and the age of the lesions by successive migrations of the parasites.

(*Annales de Médecine Vétérinaire.*)

CHOREA AND LAMINITIS AFTER PARTURITION.

BY PARANT.

THE patient, a cow, had calved without trouble, when she was attacked with clonic spasms of the muscles of the head and neck that gave rise to drooping of the ears and eyelids and hanging of the head; there was also a whistling noise made at each respiration. She was, however, able to feed, and while doing so the abnormal movements ceased. In addition, the cow was attacked with laminitis; the *os* was dilated and the uterus contained a quantity of thick red-coloured fluid that was slightly putrid. The author has but little doubt that the spasms and laminitis were caused by absorption of the uterine fluids. The animal was bled, the uterus irrigated with a warm solution of 1 per 1,000 of permanganate of potash, bromide of potassium and sulphate of soda were given internally, and recovery took place in a few days.

(*Ripertoire di Palin Sanitaire Vêtérinaire.*)

A CASE OF POISONING IN THE HORSE BY MOULDY BREAD.

BY M. PERRIN.

AN instance in which several horses were poisoned by eating mouldy bread came under the author's notice. At first it was mistaken for colic, there being low intestinal rumblings with a considerable amount of fæces passed. The flanks were tucked up and the urine was of a clear yellow colour, voided in small quantities and frequently. When the spine was pressed upon, the animal crouched down. There was disinclination to move and difficulty in walking. The expression was anxious, the mucous membranes injected, the pulse 60, full and hard; as the symptoms increased the animal fell down, and the respirations became weak and almost imperceptible, and the body covered with cold perspiration. The animal fell into a state of deep coma and insensibility. An attack of vertigo then supervened and this lasted for half an hour, during which the patient pushed against the wall with his head; this was followed again by coma. The attacks were repeated in succession.

On examining the bodies of the horses that died there was great congestion of the mucous membrane of the small intestine, colon, and cæcum, which was tumefied and ecchymosed; the liver was in parts yellow in colour and easily broken down; the brain was congested; the fungus that made the bread mouldy was the *Anophora moerdo* and the *Oidium aorentianum.*

(*Ripertoire di Palin Sanitaire Vêtérinaire.*)

NOTES ON THE ORGANISM OF EPIZÖOTIC LYMPHANGITIS.

BY GASPERINI.

THE author is of opinion that although in certain works epizöotic lymphangitis is given as a classical example of saccharomycosis, in reality it is protozoic, and due to Rivolta's cryptococcus. This opinion he bases on certain facts, and his arguments appear to be well established.

(1) The failure to obtain cultures from the contents of the *butons* of specific corpuscles.

(2) This sterility of Rivolta's corpuscles is not due to the same conditions that render it difficult or impossible to cultivate certain blastomycetes and hyphomycetes of both an animal and vegetable origin.

(3) The corpuscles, which resemble saccharomyces in process of development as fragments of torula, are only morphological appearances quite different from those of fragments of irregular or yeast cells.

(4) When examined in fresh material the corpuscles have all the special characteristics of micro-organisms—viz. (*a*) an oval piriform or spherical shape, with thick walls containing various sized granules, some of which have considerable power of movement. Sometimes in the dried pus they are seen of a semilunar shape, and stain well with Bizzoyyero's picro-carmine or Romanowsky's stain. There are also round amœboid forms that have considerable movement, formed of a very delicate cellular membrane and a distinct nucleus. They contain small refractive bodies of amorphous structure, spherical, elongated, or irregular in shape; they can be stained with Romanowsky, Marno Jenner's solution, or Ehrlich's triacid mixture.

(5) The granular contents of the cryptococcus have great resistance to cold or putrefaction.

(6) The characteristics of these pseudo-farcy diseases are those that concern the products of the parasite and those that concern their pathological details, which all point to the result being due to protozoa, not to blastomycetes or microsporidia in general.

(7) It has never been possible to reproduce the disease with blastomycetes or other organisms that have accidentally developed in cultures.

(*Atti dell Anno*, 1905, *della Societa toxana d'igiene.*)

SLIGHT DISPLACEMENT OF THE INTESTINE, OR A CASE OF COLIC IN THE HORSE.

BY DR. OHLER (NEUSTADT).

THERE is no animal more subject to attacks of colic than the horse, and this is generally attributed by writers on the subject to the peculiar anatomical arrangement of the stomach and intestines, especially of the large colon. In fact, putting on one side attacks of an inflammatory nature (gastro-enteritis) most of the colic even in the horse is due to obstruction, and in hunger cases all the *post-mortem* appearances of displacement of the large colon are seen.

The animal is covered with perspiration, the pupils dilated, the pulse 80 per minute, respirations laboured and blowing, in great distress, and sitting down on the haunches like a dog. The case is diagnosed as one of twisted colon, and that it will end fatally in a short time. The next day the owner says the animal is much better, that he suffered a few more spasms, when he passed a quantity of hard, dark coloured fæces covered with mucus, and was at once relieved, and that beyond being somewhat tired and going stiff behind he was all right. Such cases are undoubtedly from displacement of the colon, and spontaneously recover. The colon is easily twisted when the upper part is full of food, the lower portion only containing gas. The author from his experience is of opinion that, putting aside calculi, the principal cause of colic is displacement of the intestine. Torsion of the colon even to a very slight degree is sufficient to cause stenosis, followed by obstruction and tympany. In many cases a rupture o the stomach is the direct cause of the obstruction. On *post-mortem* examination all that is visible is a slight amount of congestion of the small intestine and peritoneum. The usual practice in such cases is to induce peristaltic movement by the use of eserin, arecoline, barium chloride, &c., but the author does not agree with their use, and prefers morphine. He states that after the administration of opium he has often seen copious evacuations as if from a purgative, and this fact confirms his opinion that the majority of cases of colic in the horse are due to slight displacement of the intestine.

(Wochenschrift für Tierheilkunde.)

THE INFLUENCE OF FOOD ON THE COMPOSITION OF MILK.

BY O. JENSEN.

MILK is essentially a product whose composition is only subject to very slight degrees of variation, but the author tried the following experiments to see if they had any effect on it.

(1) The basis of the fluid was hay and grass, with the addition of ascertained quantities of lactate of iron, sulphate of lime, phosphate of lime, phosphate of soda, sea-salt, and nitrate of potash.

(2) Hay and beetroots.

(3) Sesame cake, bran and hay.

(4) Hay from both poor and richly manured land.

The animals the subjects of the experiments were divided into lots, but unfortunately, the number being limited, there were only three in each lot.

The following are the results :—

(1) With large doses of nitrate of potash there were traces of nitric acid in the milk.

(2) With large quantities of beetroot there was an increase of volatile acids in the fatty constituents of the butter.

(3) With sesame cake the oleic acid in the fatty material was increased.

(4) With food rich in phosphorus, the amount of phosphates and the degree of acidity in the milk were increased.

(5) With food poor in alkalies and phosphoric acid, the amount of potash was decreased, also the degree of acidity and coagulability.

The result of these experiments shows that the acidity of the milk is influenced by the food and the amount of margarine material to a slight degree, but generally speaking the food only exerts a slight influence on the composition of the milk.

(*Annuaire Agricole de la Suisse.*)

TWO CASES OF RUPURE OF THE UTERUS WITH RECOVERY IN THE COW.

BY BREHER.

(*a*) The animal, which was in calf, was reduced to a skeleton. On completion of her time delivery was impossible owing to retroversion of the uterus. The author attempted to reduce it, but found there was a putrefied fœtus floating in an infected fluid. The head and shoulders were easily extracted, but the author discovered a rent in the left wall of the uterus through which the hand could be passed into the abdomen. The case was considered hopeless, and slaughter was advised but not accepted by the owner. The calf was delivered and the patient allowed to take care of herself, she recovered and subsequently fattened and made a good carcase of beef.

(*b*) Another case is mentioned in which the calf was forcibly extracted, the left wall of the uterus being ruptured. This cow also subsequently recovered.

(*Berliner tierarzt. Wochenschrift.*)

CASE OF TWISTED BOWEL OBSTRUCTION TREATED WITH ARECOLINE—RECOVERY.

BY KNOLL.

The patient, aged 20, was attacked with violent colic, went down on his knees so as to keep his hind quarters elevated. The bowels appeared to be torpid, and there was absolutely no intestinal murmur. When the hand was introduced into the rectum an obstruction was detected about 60 centimetres from the anus. A twist was diagnosed, and a dose of 0·16 grammes (or double the usual quantity) of arecoline was injected. In a few minutes the animal was profusely salivated, the movement of the intestines was restored, the rectum then filled with fæces, and relief obtained.

(*Berliner tierarzt. Wochenschrift.*)

INFECTIOUS PARAPLEGIA.

BY KULL.

The author had seen a previous outbreak in 1904; the present one took place in October and November, 1905, amongst the same stud of horses. The designation "infectious paraplegia" appears to be an appropriate one, for, although the symptoms vary and the respiratory organs are affected, the most important complication is paralysis.

None of the horses affected the previous year were again attacked, so there appears to be strong proof that an immunity is conferred; altogether there were twenty-six cases. The leading symptoms were great prostration and depression, with difficulty in standing; pulse 34 to 36, respirations 10 to 12, temperature 36·9° to 37·5° C., in one case rising to 39° C. The mucous membranes were of a greyish colour, and ejected a discharge of serum from the nostrils; there was loss of sensation in the hind quarters, dribbling of the urine, and in some cases a profuse flow of tears. In the more severe cases there was complete paralysis of the hind limbs, and the animal was unable to stand. There was high temperature and loss of appetite. About the third or fourth day œdematous patches appeared on the hind quarters, with enlargement of the submaxillary glands and a purulent discharge from the nose. In ordinary cases the paralysis disappeared in about three weeks, in more severe cases in five or six. Two severe cases were destroyed; in both there were hæmorrhagic patches on the brain over the cerebrum, blood-stained effusions into the lumbar muscles, and inflammation of the bladder, the walls of which were thickened. The symptoms were treated, the sick isolated, and disinfectants freely used.

(*Zeitschrift für Veterinarkünde.*)

USE OF CREOSOTE FOR FUMIGATION.

BY DR. DROUET.

Creosote can be used alone or in conjunction with other drugs in cases of nasal gleet, catarrh, strangles, and thoracic and pulmonary complaints in general. The patient is placed in a small stable or separate box, and all the openings hermetically sealed up. A stable bucket is half filled with hay, and about half an ounce of creosote sprinkled over it. About a quart or two of really boiling water is then poured over it, and the hay well stirred round till no more fumes are given off. The door of the box is then shut for about a hour and a half.

(*Recueil de Médecine Vétérinaire.*)

PHLEGMONOUS AND FISTULOUS DERMATITIS IN THE DOG.

BY CUILLE (TOULOUSE).

Phlegmonous fistulous dermatitis in the dog is a disease of the skin, characterised in the earlier stages by abscesses in the subcutaneous connective tissue that leave persistent fistulæ behind them. It is generally seen in hounds and sporting dogs, round the lips, sheath, elbows, forearms, backs, and on the toes. The skin is at first swollen and thickened, the hair thin, comes off, and small abscesses form, which burst, forming fistulæ, that discharge a thick, blood-stained pus.

In some cases the interdigital spaces are affected with multiple abscess, the part being swollen and very painful. The abscesses do

not heal, and fresh ones form, extending up the limb to the elbows or thigh. The pus contains streptococci and a bacillus that will not take Gram's stain. The abscesses in the interdigital spaces, before they burst, contain Bang's necrotic bacillus and long filaments that do not take Gram's stain. The bacillus is pathogenic with the guinea-pig, dog, and rabbit. Natural infection takes place through the medium of wounds, abrasions, scratches from thorns, &c. The disease is very intractable: the best plan is to curette the fistulæ, and inject them with oxygen water or tincture of iodine; if, however, the surface is only of a small extent, the part should be excised and the edges of the wound united by sutures.

(*Revue Vétérinaire.*)

SECTION OF THE SPHINCTER MUSCLE OF THE TEAT IN COWS THAT ARE "HARD MILKERS."

BY ELOIRE.

THE term "hard milker" is applied to cows that, in the absence of any diseased condition of the teat, only give a very small stream of milk when the teat is drawn with considerable force. The obstruction is due to constriction of the orifice, and the remedy is section of the sphincter muscle.

The operation should not be attempted (1) directly after calving, especially in young cows that are deep milkers, especially if there is obstruction in the gland; (2) if there is any eruptive disease of the gland, such as cow-pox; (3) if there are warts which are easily inoculable; (4) if there is mammitis; (5) if there are chapped or fissured teats; (6) during an outbreak of foot and mouth disease; (7) immediately after difficult parturition.

The udder is washed and disinfected in the usual manner, the cow secured with bull-dogs on the nose, and the hind legs "spangled" with a rope above the hocks.

For the operation a Guilbert's trayonotome, either simple or three-bladed, is used. The operator places himself on the flank of the animal so as to face the gland. The teat is taken in the left hand and a few drops of milk drawn. The teat is then compressed between the finger and thumb, so as to swell the duct; and the trayonotome, held vertically between the finger and thumb of the other hand, is passed straight into the axis of the canal and pushed in. It is then withdrawn, taking care that it is still kept vertical to the axis, and the operation is finished in less time than it takes to describe.

The section of the sphincter is made larger or smaller according to the will of the operator, according to the depth to which the instrument is passed into the canal, and this should depend on the degree of contraction. A few drops of milk can be drawn, and from the way they are passed the degree to which the sphincter has been divided can be estimated. Care has to be taken not to completely divide the sphincter, otherwise the cow will pass her milk involuntarily. The right degree of section is quickly acquired, but it is always advisable to under rather than overdo it. After the operation, beyond ordinary cleanliness, particularly in the bedding, nothing is required. The author records over a hundred cases, all of which have been successful.

(*Oesterreichische Monatsschrift für Tierheilkunde.*)

CASE OF POISONING BY SULPHUR IN THE HORSE.

BY ALES.

THE groom had been ordered by the owner to dust a collar gall over with flowers of sulphur to heal it. By some curious process of reasoning he concluded that if it was also administered internally the wound would heal in half the time. Acting upon this, about 1½ kilogrammes in gruel were divided amongst five animals. Three hours later one was attacked with violent colic, frequently throwing himself down; conjunctiva injected, pulse quick and feeble, a fœtid diarrhœa, smelling strongly of sulphuretted hydrogen, legs cold, great depression, tottering gait; rigors, and reddish-brown urine; the animal died in a few hours.

In another case the animal did not become ill for forty-eight hours, when there was loss of appetite, fœtid diarrhœa, blowing, weak thready pulse, conjunctiva brick red and covered with petechiæ, and an unquenchable thirst. The next day these urgent symptoms had lessened, but the diarrhœa lasted for twenty-four hours longer. The remaining three animals presented the same symptoms, but in a lesser degree.

Treatment consisted of the administration of milk, flour, gruel, and white of eggs, with sub-nitrate of bismuth, and rice water enemata.

(*Revue Vétérinaire.*)

ECHINOCOCCI IN THE SPLEEN OF A DOG.

BY TABUSSO.

THE patient was a bull-dog, aged 8. He became very emaciated, and dull and low spirited; the abdomen was greatly enlarged and painful on pressure; the respiratory movements costal, dyspnœic, but no fever. An abdominal tumour was diagnosed, and the patient destroyed.

On opening the abdomen a soft lobulated tumour of a dirty white colour was disclosed, which on examination proved to consist of a collection of cysts adhering to the spleen, which with the heart was greatly hypertrophied. The growth weighed 800 grammes, and measured 25 cm. in diameter, and on examination proved to be a collection of hydatid cysts.

(*Archivio Scientifico della Reale Societa ed. Accademia Veterinaria Italiana.*)

THE ACTION OF BARIUM SALTS ON THE PIG.

BY DR. KABITZ, HANOVER.

A SERIES of experiments was made in the Hanover Veterinary School on the action of sulphate and carbonate of barium, both natural and precipitated, on the pig. The experiments were made on three-month-old pigs, and the drug was given in the food, which consisted of grain and cooked potatoes. The sulphate was given in doses of 1 gramme per kilogramme live weight the first, and double the quantity the second day, to a pig weighing 17·500 kilogrammes, without any effect.

A pig weighing 18·500 kilogrammes was killed in nine and a half hours by a dose of 1 gramme per kilogramme live weight of precipitated carbonate of barium. On examination after death there was nothing to be seen but slight congestion of the lining membrane of the intestine.

A pig weighing 18·750 kilogrammes was given doses of 1 and 2 grammes per kilogramme live weight of natural carbonate of barium, which gave rise to weakness, vomiting, difficulty in moving, moaning, but no diarrhœa; the animal ultimately recovered.

Another pig of the same weight that had previously taken the sulphate, was given the barium under the same conditions and died in four hours. The carbonate was given in doses of 2 grammes per kilogramme live weight, in pieces as large as from a pea to a bean, and it did not cause either diarrhœa or vomiting.

The poisonous properties of the salts of barium appear to depend on their degree of solubility. In the stomach the carbonate forms a chloride which acts on the nervous system.

The portion that passes into the intestine is unchanged by the alkaline intestinal secretion. This accounts for the carbonate being well tolerated when in large pieces.

(*Deutsche tierarztliche Wochenschrift.*)

FORMALIN IN MILK.

BY SUMMERFELD.

BEHRING'S observations on the preservation of milk by formalin induced the author to study the changes that micro-organisms undergo.

Formalin in the proportions of from 1 to 5,000 or 1 to 10,000 renders milk almost sterile. The bactericidal property of formal is nullified if the milk is kept at a temperature of over 15° C.; at 20° C. and over it contains almost as many germs as control samples after twenty-four hours, and at 37° C. the action of formal is almost *nil*. A low temperature increases its action. With the addition of 1 per 10,000, and a temperature of 7 to 8° C., in six days the number of organisms fall from 2,100 to 222 per cc.

The addition of formal is an excellent method of preserving specimens for analysis, but neither it nor any other chemical should be used for preserving milk for food.

Milk that is properly cooled at 10° C. after being drawn, after the lapse of twenty-four hours has no increase in the number of organisms, indeed, they are often diminished. It is slightly acid, but quite fit for use. The only method that should be permitted to preserve milk intended for food is to keep it at a temperature below 10° C.

The author found various micro-organisms in broth and milk that had been treated with formalin. The diphtheria bacillus was virulent after forty-eight hours in a 1 to 5,000 mixture of milk and formalin. The *Bacillus coli* retained its activity in a 1 to 5,000 mixture, and was not affected by a 1 to 10,000. The typhoid bacillus was destroyed in a 1 to 5,000 mixture of formalin and broth at a temperature of 20° C. in twenty-four hours, and a 1 to 10,000 greatly decreased its vitality.

(*Zeitschrift für Hygiene.*)

OXYGEN WATER.

BY DUPUY.

ALTHOUGH oxygen water has been used with success, it has drawbacks. In human surgery Dr. Moreau reports a serious case of secondary hæmorrhage after amputation of the thigh, which he attributes to the action of oxygen water on the catgut ligatures, which it destroyed.

Reynier and Bichut have seen mortification set up by its use in from 10 to 12 volumes. Sallement had a case of sudden death in a case of purulent pleurisy after washing the pleura with a litre of oxygen water. The author has seen ill results in veterinary practice from its use.

In a case of punctured capped elbow that had been going on for seventeen days he injected twice daily about 44 cc. of 12 per cent. oxygen water. Two days later there was great swelling of the part, which was painful and crepitated when pressed. The animal had difficulty in moving, and was off its feed. The lymphatic vessels on the forearm were corded, and the limb down to the knee was œdematous. The respirations were quickened, and the temperature 38·5° C. The oxygen water was discontinued, the swellings punctured, giving exit to a quantity of serum, and the œdema gradually subsided.

The author is of opinion that oxygen water should be used carefully, the water should be sterile, and should not contain more than 12 volumes of gas.

(*Recueil d'hygiene et de Médecine Vétérinaire.*)

Books and Periodicals, &c., Received.

Recueil de Médecine Vétérinaire; Report of the Board of Agriculture; Department of Agriculture (Ireland); Veterinary News; Our Dogs; Revue Vétérinaire; American Veterinary Review; Journal of the Royal Army Medical Corps.

Letters and Communications, &c.

Mr. Grasby; Professor W. L. Williams; Professor Liantard; Mr. Kelly; Professor Craig; Mr. Linton; Mr. Thomas; Mr. McKenny; Mr. Watson.

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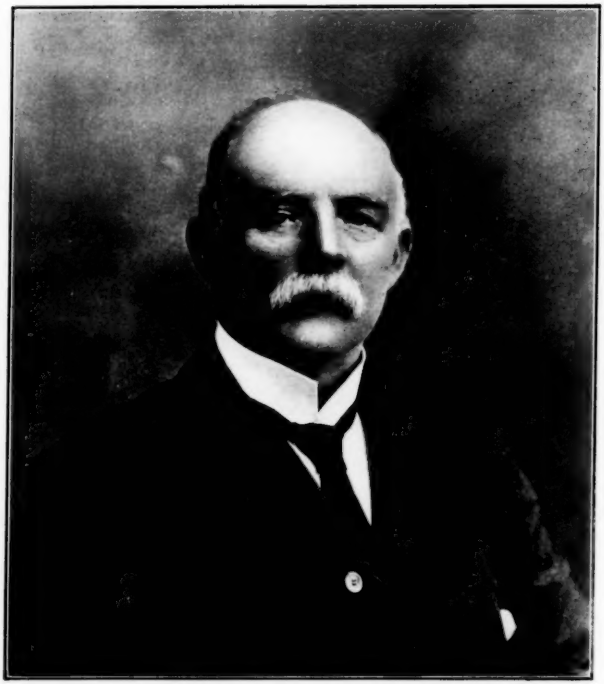

THE LATE MR. JAMES CLARK, F.R.C.V.S.

Examiner in Therapeutics and Toxicology, and late Examiner in Diseases of Cattle to the Royal College of Veterinary Surgeons.